

**Final
Site-Specific Field Sampling Plan,
Site-Specific Safety and Health Plan, and Site-Specific
Unexploded Ordnance Safety Plan Attachments,
Former 37mm Antitank Range, Parcel 230Q-X,
and Former Rifle Range, Parcel 149Q**

**Fort McClellan
Calhoun County, Alabama**

**Task Order CK10
Contract No. DACA21-96-D-0018
IT Project No. 796887**

April 2002

**Final
Site-Specific Field Sampling Plan Attachment
Former 37mm Antitank Range, Parcel 230Q-X,
and Former Rifle Range, Parcel 149Q**

**Fort McClellan
Calhoun County, Alabama**

Prepared for:

**U.S. Army Corps of Engineers, Mobile District
109 St. Joseph Street
Mobile, Alabama 36602**

Prepared by:

**IT Corporation
312 Directors Drive
Knoxville, Tennessee 37923**

**Task Order CK10
Contract No. DACA21-96-D-0018
IT Project No. 796887**

April 2002

Revision 0

Table of Contents

	Page
List of Tables	iii
List of Figures	iii
List of Acronyms	iv
Executive Summary	ES-1
1.0 Project Description	1-1
1.1 Introduction	1-1
1.2 Site Description	1-1
1.2.1 Archive Search Report Ranges	1-2
1.2.2 Aerial Photographs	1-4
1.3 Scope of Work	1-6
2.0 Summary of Existing Environmental Studies	2-1
2.1 Environmental Baseline Survey	2-1
2.2 Previous Site Investigations	2-2
2.3 Fill Area Definition at Parcel 230(7)	2-3
3.0 Site-Specific Data Quality Objectives	3-1
3.1 Overview	3-1
3.2 Data Users and Available Data	3-1
3.3 Conceptual Site Exposure Model	3-2
3.4 Decision-Making Process, Data Uses, and Needs	3-3
3.4.1 Risk Evaluation	3-3
3.4.2 Data Types and Quality	3-4
3.4.3 Precision, Accuracy, and Completeness	3-4
4.0 Field Activities	4-1
4.1 UXO Survey Requirements and Utility Clearances	4-1
4.1.1 Surface UXO Survey	4-1
4.1.2 Downhole UXO Survey	4-1
4.1.3 Utility Clearances	4-1
4.2 Environmental Sampling	4-2
4.2.1 Surface Soil Sampling	4-2
4.2.1.1 Sample Locations and Rationale	4-2
4.2.1.2 Sample Collection	4-2

Table of Contents (Continued)

	Page
4.2.2 Subsurface Soil Sampling	4-2
4.2.2.1 Sample Locations and Rationale	4-3
4.2.2.2 Sample Collection	4-3
4.2.3 Permanent Monitoring Wells	4-4
4.2.4 Groundwater Sampling	4-5
4.2.4.1 Sample Locations and Rationale	4-5
4.2.4.2 Sample Collection	4-5
4.2.5 Surface Water Sampling	4-5
4.2.5.1 Sample Locations and Rationale	4-5
4.2.5.2 Sample Collection	4-6
4.2.6 Sediment Sampling	4-6
4.2.6.1 Sample Locations and Rationale	4-6
4.2.6.2 Sample Collection	4-6
4.3 Decontamination Requirements	4-6
4.4 Surveying of Sample Locations.....	4-7
4.5 Analytical Program.....	4-7
4.6 Sample Preservation, Packaging, and Shipping	4-8
4.7 Investigation-Derived Waste Management	4-8
4.8 Site-Specific Safety and Health.....	4-8
5.0 Project Schedule.....	5-1
6.0 References	6-1

Attachment 1 – List of Abbreviations and Acronyms

List of Tables

Number	Title	Follows Page
2-1	Groundwater Elevations, Parcels 230(7) and 185(7)	2-3
2-2	Well Construction Data, Parcels 230(7) and 185(7)	2-3
3-1	Summary of Data Quality Objectives	3-1
4-1	Sampling Locations and Rationale	4-2
4-2	Surface and Subsurface Soil Sample Designations and QA/QC Sample Quantities	4-2
4-3	Groundwater Sample Designations and QA/QC Sample Quantities	4-5
4-4	Surface Water and Sediment Sample Designations and QA/QC Sample Quantities	4-5
4-5	Analytical Samples	4-7

List of Figures

Number	Title	Follows Page
1-1	Site Location Map	1-1
1-2	Site Map	1-2
1-3	ASR Plate 5 (World War II to 1950)	1-3
1-4	ASR Plate 6 (1950 to 1973)	1-3
1-5	ASR Plate 8 (Chemical School Ranges and Training Areas)	1-3
1-6	1944 Aerial Photograph	1-4
1-7	1961 Aerial Photograph	1-4
1-8	1969 Aerial Photograph	1-4
3-1	Human Health Conceptual Site Exposure Model	3-3
4-1	Sample Location Map	4-2

List of Acronyms

See Attachment 1, List of Abbreviations and Acronyms

Executive Summary

In accordance with Contract Number DACA21-96-D-0018, Task Order CK10, IT Corporation (IT) will conduct site investigation activities at Former 37mm Antitank Range, Parcel 230Q-X, and Former Rifle Range, Parcel 149Q, at Fort McClellan, Calhoun County, Alabama, to determine if potential site-specific chemicals are present at this site. The purpose of this site-specific field sampling plan is to provide technical guidance for sampling activities at Former 37mm Antitank Range, Parcel 230Q-X, and Former Rifle Range, Parcel 149Q.

Former 37mm Antitank Range, Parcel 230Q-X, and Former Rifle Range, Parcel 149Q, are located in the north-central area of the Main Post at FTMC. Former 37mm Antitank Range was built during World War II and included targets that moved on a track. In 1958 the use of the range changed. The track was removed and a new firing line was established for an M1 Rifle Transition Table, believed to be the Former Rifle Range, Parcel 149Q. The range was closed by 1967, and the area was listed as Training Area T-31 with an unspecified use.

IT will collect 13 surface soil samples, 13 subsurface soil samples, 3 groundwater samples, 2 surface water and 2 sediment samples at the area of investigation. Potential contaminant sources at Former 37mm Antitank Range and Former Rifle Range are primarily lead and explosives. Chemical analyses of the samples collected during the field program will include nitroaromatic/nitramine explosives and metals. Sediment samples will be analyzed for total organic carbon and grain size. In addition, 10 percent of each sample type will be analyzed for volatile organic compounds, semivolatile organic compounds, pesticides, and herbicides. Results from these analyses will be compared with site-specific screening levels, ecological screening values, and background values to determine if potential site-specific chemicals are present at the site at concentrations that pose an unacceptable risk to human health or the environment.

Because an impact area is located within the study area and the surrounding parcels have been used as impact areas, the potential exists for unexploded ordnance (UXO) at Former 37mm Antitank Range and Former Rifle Range. Therefore, prior to initiating field activities at Former 37mm Antitank Range and Former Rifle Range, IT will conduct UXO avoidance activities as outlined in Appendix E of the installation-wide sampling and analysis plan (SAP) and the attached site-specific UXO safety plan. Surface sweeps and downhole surveys will be conducted to identify anomalies for the purpose of UXO avoidance.

This site-specific field sampling plan attachment to the SAP for this site investigation will be used in conjunction with the site-specific safety and health plan, the site-specific UXO safety plan, the installation-wide work plan, and the SAP. The SAP includes the installation-wide safety and health plan, waste management plan, ordnance and explosives management plan, and quality assurance plan. Site-specific hazard analyses are included in the site-specific safety and health plan.

1.0 Project Description

1.1 Introduction

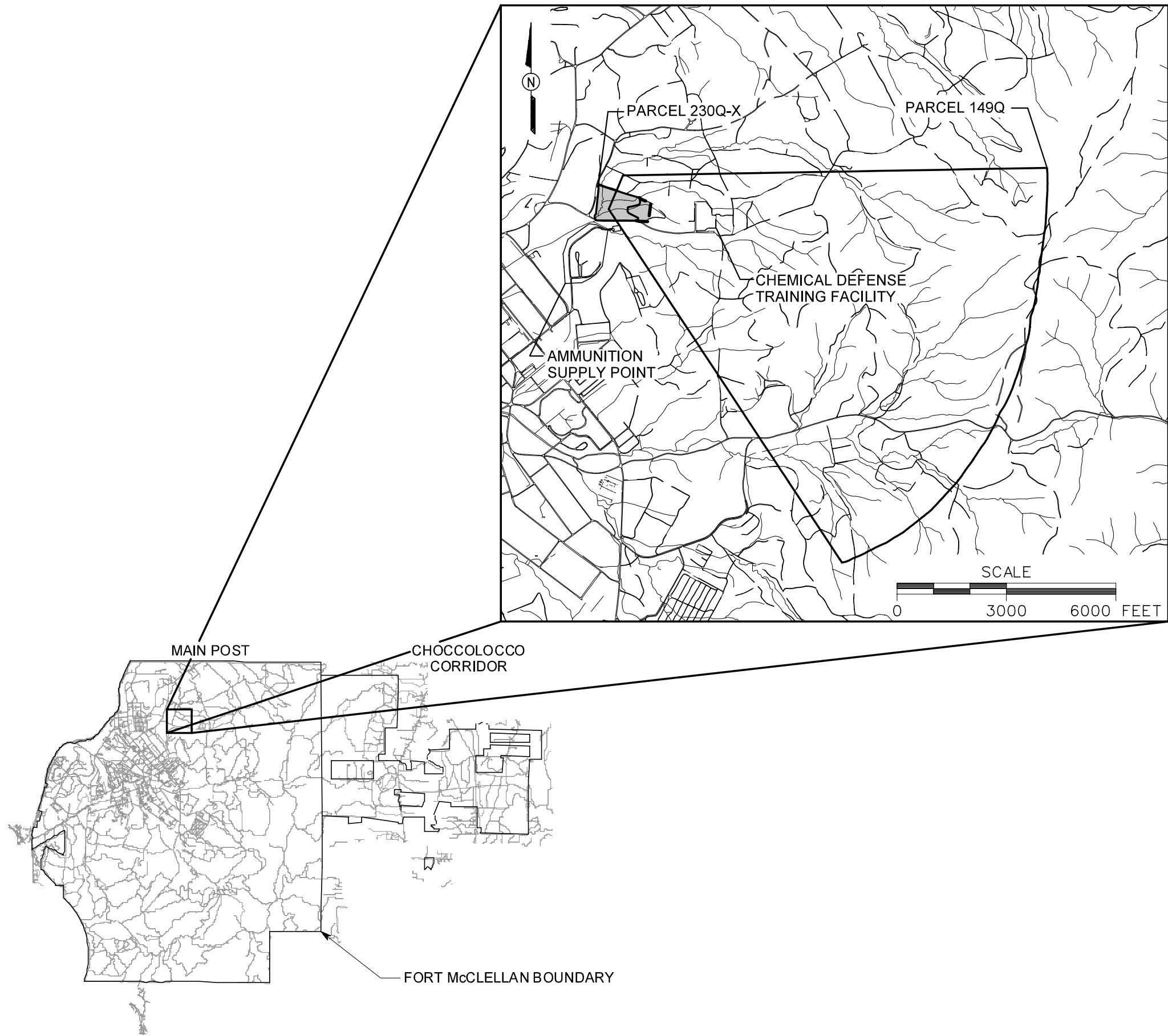
The U.S. Army is conducting studies of the environmental impact of suspected contaminants at Fort McClellan (FTMC) in Calhoun County, Alabama, under the management of the U.S. Army Corps of Engineers (USACE)-Mobile District. The USACE has contracted IT Corporation (IT) to provide environmental services for the site investigation (SI) at the Former 37mm Antitank Range, Parcel 230Q-X, and the Former Rifle Range, Parcel 149Q, under Task Order CK10, Contract Number DACA21-96-D-0018 (USACE, 1999a).

This site-specific field sampling plan (SFSP) is an attachment to the installation-wide sampling and analysis plan (SAP) for FTMC (IT, 2002a) and has been prepared to provide technical guidance for sample collection and analysis for this SI. This SFSP will be used in conjunction with the site-specific safety and health plan (SSHP) and site-specific unexploded ordnance (UXO) safety plan developed for the Former 37mm Antitank Range and Former Rifle Range and the installation-wide work plan (WP) (IT, 2002b) and SAP. The SAP includes the installation-wide safety and health plan, waste management plan, ordnance and explosives management plan, and quality assurance plan (QAP). Site-specific hazard analyses are included in the SSHP.

1.2 Site Description

The Former 37mm Antitank Range, Parcel 230Q-X, and Former Rifle Range, Parcel 149Q, are located in the north-central area of the Main Post at FTMC, immediately north of the Ammunition Supply Point, Parcels 199(7) and 197(7), and west of the Chemical Defense Training Facility, Parcel 126Q-CWM (Figure 1-1). Parcel 230Q-X was identified as a 37mm Antitank Range from the 1946 Sanitary Sewage System map by Environmental Science and Engineering, Inc. (ESE) (ESE, 1998). The environmental baseline survey (EBS) reports that Former Rifle Range, Parcel 149Q, appeared on a 1959 historical range map.

The area of investigation has had three documented uses since World War II. The area was constructed as a 37mm antitank range during World War II, with a direction of fire to the east (ESE, 1998). Originally, the 37mm Antitank Range was approximately 300 feet north to south and 1,200 feet in length east to west (approximately 9 acres). The range was equipped with a track system used to move targets. By 1958, the track had been removed and a new firing line had been established for the M-1 Rifle Transition Table, believed to be the Former Rifle Range,



LEGEND

- UNIMPROVED ROADS AND PARKING
- PAVED ROADS AND PARKING
- PARCEL BOUNDARY
- EXTENDED AREA OF INVESTIGATION
- SURFACE DRAINAGE / CREEK

FIGURE 1-1
SITE LOCATION MAP
FORMER 37mm ANTITANK RANGE
PARCEL 230Q-X
FORMER RIFLE RANGE
PARCEL 149Q

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Contract No. DACA21-96-D-0018

Parcel 149Q (Figure 1-2). By 1967, the range was closed and listed as T-31 (USACE, 1999b). An impact area was noted by ESE at the east end of Parcel 230Q-X (Figure 1-2).

The parcel boundary for Former Rifle Range overlaps the eastern portion of Former 37mm Antitank Range. The line of fire of the Former Rifle Range appears to be to the southeast. No information was available regarding this range, such as dates of use, types or ordnance used, or operation.

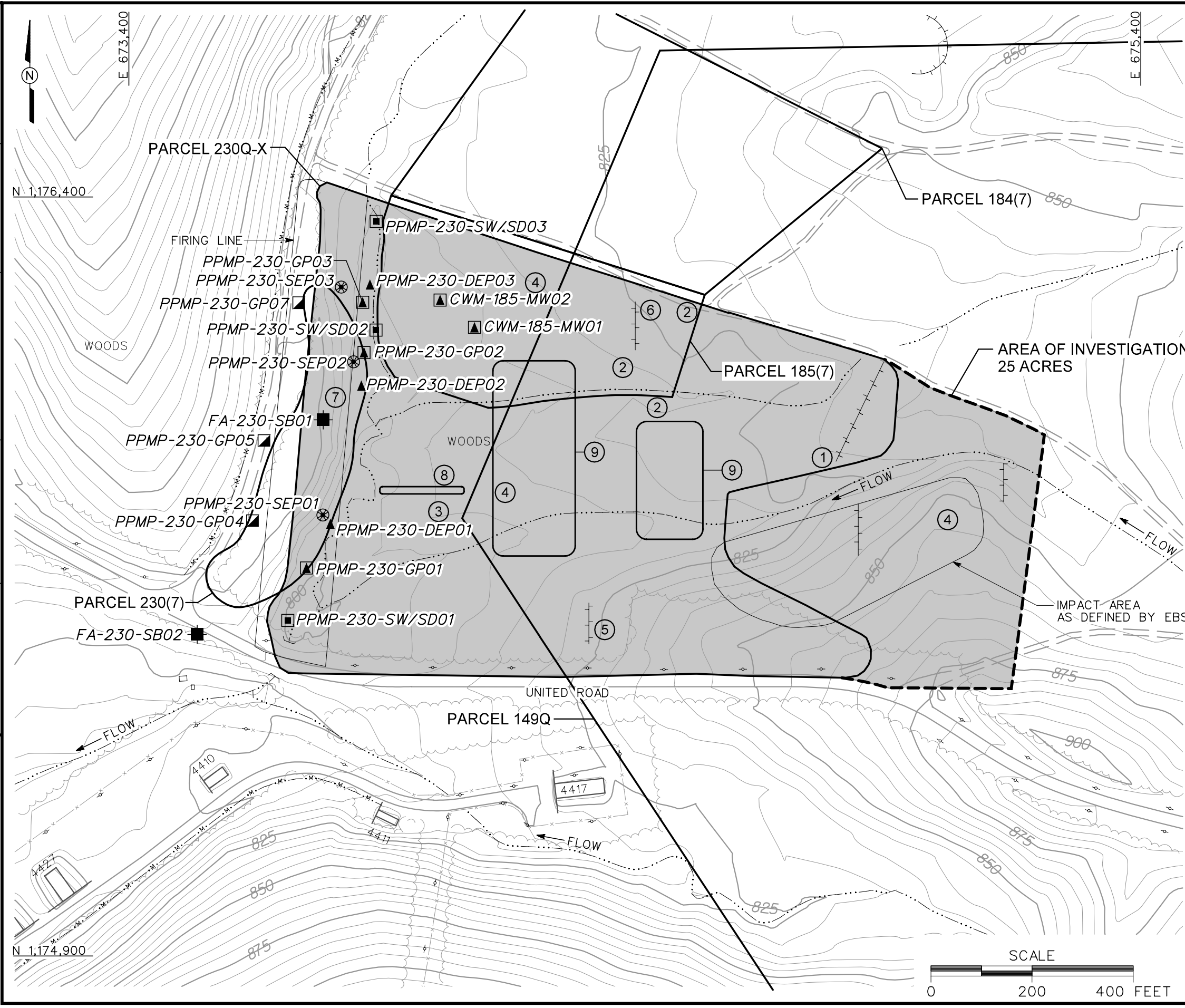
IT personnel conducted site walks in December 2001. In the center portion of the area of investigation are two pop-up targets areas. The remnants of a platform located behind a berm were noted in the north-central portion of the parcel, and a steel pole with three pulleys was located behind a berm in the south-central portion. It is believed that these items were once part of a moving target system. Other surface features noted include: a shallow, east-west trending trench in the west-central portion of the area of investigation; a depression located approximately 1,200 feet downrange (Parcel 230Q-X); and three downrange berms, one in the impact area noted by ESE (Figure 1-2). Several 35-gallon drums were located in the north-central portion of Parcel 230Q-X. Along the western boundary of Parcel 230Q-X are three temporary wells installed for the investigation at the Fill Area North of Landfill No. 2, Parcel 230(7). Two recently installed permanent wells were identified in the northwest portion of Parcel 230Q-X (Figure 1-2).

1.2.1 Archive Search Report Ranges

The USACE 1999b *Archives Search Report (ASR), Maps, Fort McClellan, Anniston, Alabama* was reviewed for the Former 37mm Antitank Range, the Former Rifle Range, and other ranges that potentially overlap the parcel boundaries. The ASR plates that show additional ranges in the area of this investigation are as follows:

- Plate 4 – Inter-War Range Use (World War I to World War II)
- Plate 5 – World War II to 1950 Range Use
- Plate 6 – 1950 to 1973 Range Use
- Plate 7 – 1974 to 1996 Range Use
- Plate 8 – Chemical School Ranges and Training Areas
- Plate 10 – Cumulative Map of All Ranges.

ASR text and plates do not recognize the Former Rifle Range, Parcel 149Q. Information concerning the shape, size, and dates of use for the location of this parcel was received from information in the EBS.



LEGEND

- UNIMPROVED ROADS AND PARKING
- PAVED ROADS AND PARKING
- BUILDING
- TOPOGRAPHIC CONTOURS (CONTOUR INTERVAL - 5 FOOT)
- TREES / TREELINE
- EXTENDED AREA OF INVESTIGATION
- FIRING LINES
- SURFACE DRAINAGE / CREEK
- MANMADE SURFACE DRAINAGE FEATURE
- FENCE
- UTILITY POLE
- BERM
- EXISTING SURFACE WATER/SEDIMENT SAMPLE LOCATION
- EXISTING SUBSURFACE SOIL SAMPLE LOCATION
- EXISTING SURFACE AND SUBSURFACE SOIL SAMPLE LOCATION
- EXISTING GROUNDWATER, SURFACE AND SUBSURFACE SOIL SAMPLE LOCATION
- EXISTING DEPOSITIONAL SOIL SAMPLE LOCATION
- EXISTING SEEP WATER SAMPLE LOCATION

TRAINING AIDS/PHYSICAL FEATURES OBSERVED

- ① 5-GALLON PLASTIC LID
- ② 35-GALLON DRUM
- ③ SHALLOW PITS
- ④ DEPRESSION
- ⑤ STEEL POLE WITH 3 PULLEYS
- ⑥ REMNANTS OF PLATFORM
- ⑦ 5-GALLON SMOKE POTS - FROM FILL AREA
- ⑧ TRENCH
- ⑨ POP-UP TARGET AREA

FIGURE 1-2
SITE MAP
FORMER 37mm ANTITANK RANGE
PARCEL 230Q-X
FORMER RIFLE RANGE
PARCEL 149Q

U. S. ARMY CORPS OF ENGINEERS
MOBILE DISTRICT
FORT McCLELLAN
CALHOUN COUNTY, ALABAMA
Contract No. DACA21-96-D-0018


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Plate 4 (Inter-War Use). A Machine Gun Range (OA-05) is located north of this area of investigation. The ASR states that the machine gun range was built during World War I and abandoned prior to World War II. The Machine Gun Range surface danger zone, or range fan, overlaps a portion of the future range fan for Parcel 149Q.

Plate 5 (World War II to 1950). The Former 37mm Antitank Range (OA-04) is located immediately south of Rifle Range (OA-07), identified as Range 31 in the ASR text. It falls within an unidentified range fan possibly intended to represent both Former 37mm Antitank Range and Rifle Range (OA-07) (Figure 1-3). According to the ASTR, the Former 37mm Antitank Range (OA-04) was built during World War II and included a moving target on a track. By 1958, the track was removed and an M1 rifle range was established. By 1967, the rifle range was closed and the area was listed as Training Area T-31. The ASR states that Range 31 (OA-07) first appeared during World War II with the initial use unknown. By 1958, the range was used as a machine gun transition range. The 1967 range map lists chemical munitions as the range use. A variety of explosive devices were reportedly used such as 40mm grenade, Fougasse, smoke, flame throwers, light antitank weapons, and incendiary rockets, but no report of toxic chemicals being used.

Plate 6 (1950-1973). The Former 37mm Antitank Range is identified on Plate 6 of the AST, but may be intended to be the Former Rifle Range, Parcel 149Q (Figure 1-4).

Plate 7 (1973 to 1996). The study area is no longer shown on Plate 7 of the ASR, and no new ranges are identified in the vicinity.

Plate 8 (Chemical School Ranges and Training Areas). According to Plate 8, former Training Area 31 (Range AOC-1) occupies an area that overlaps Former 37mm Antitank Range (Figure 1-5). ASR records indicate that the study area was used as Training Area T-31 beginning in 1967 (USACE, 1999b). However, the EBS compiled by ESE in 1998 indicates that only the northern portion of the Former 37mm Antitank Range was used for Training Area T-31 activities, while ASR Plate 8 indicates that the entire area was used.

Plate 10 (Cumulative Map of All Ranges). Plate 10 shows the Former 37mm Antitank Range is now within an area color-coded as Chemical Ranges and Training Areas and identified as Training Area T-31, Technical Escort Reaction Training Area.

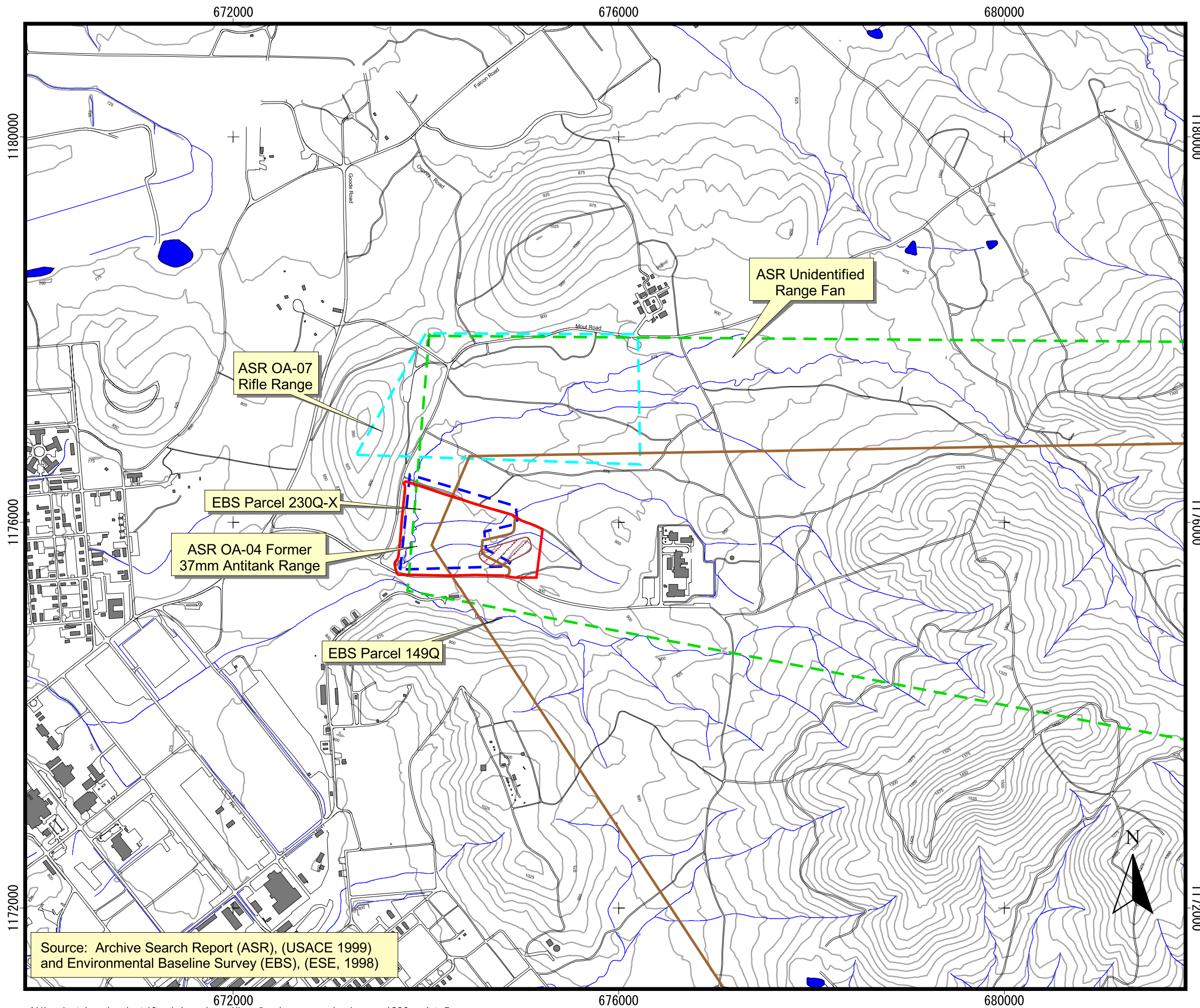
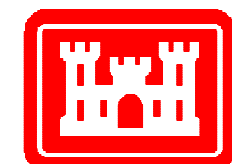
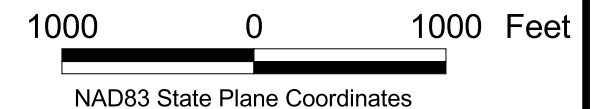
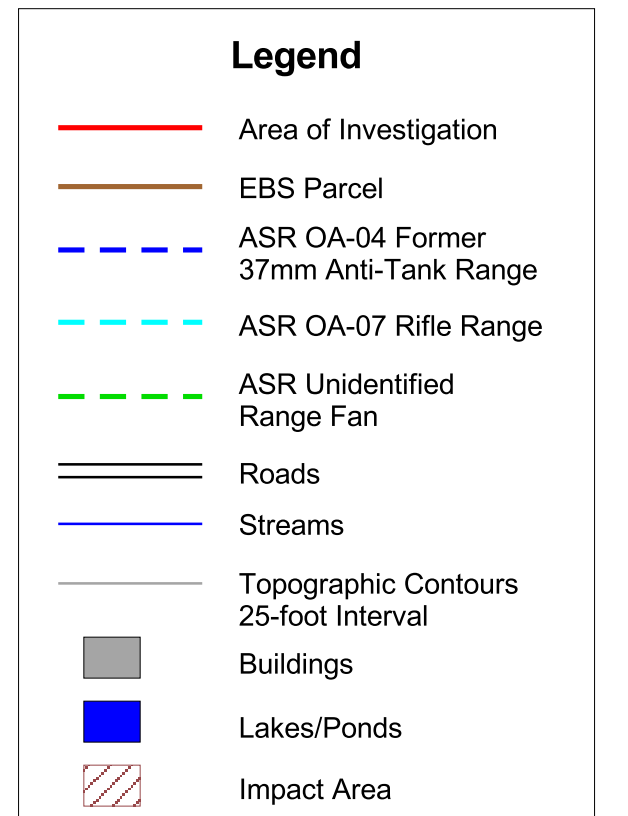
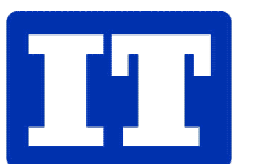


Figure 1-3
ASR Plate 5
World War II to 1950)
Range Location Map
Former 37mm Antitank
Range, Parcel 230Q-X and
Former Rifle Range,
Parcel 149Q
Fort McClellan, Alabama

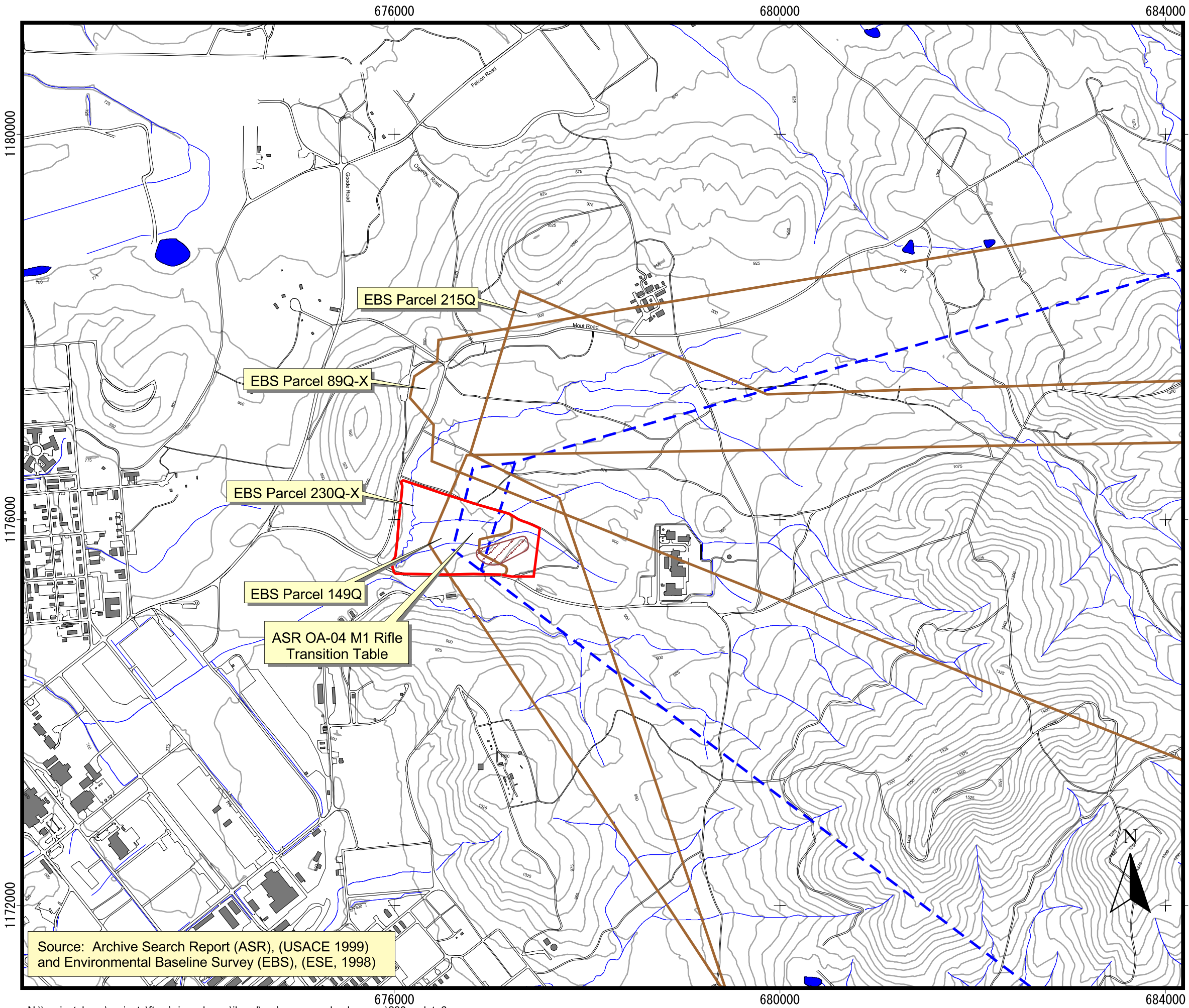


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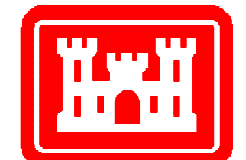
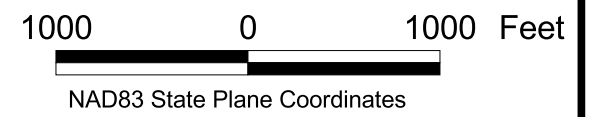
Source: Archive Search Report (ASR), (USACE 1999)
and Environmental Baseline Survey (EBS), (ESE, 1998)

Figure 1-4

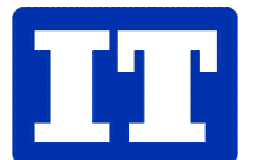
**ASR Plate 6 (1950 to 1973)
Range Location Map**
Former 37mm Antitank
Range, Parcel 230Q-X and
Former Rifle Range,
Parcel 149Q
Fort McClellan, Alabama

Legend

- Area of Investigation
- EBS Parcel
- ASR OA-04 M1 Rifle Transition Table
- Roads
- Streams
- Topographic Contours 25-foot Interval
- Buildings
- Lakes/Ponds
- Impact Area



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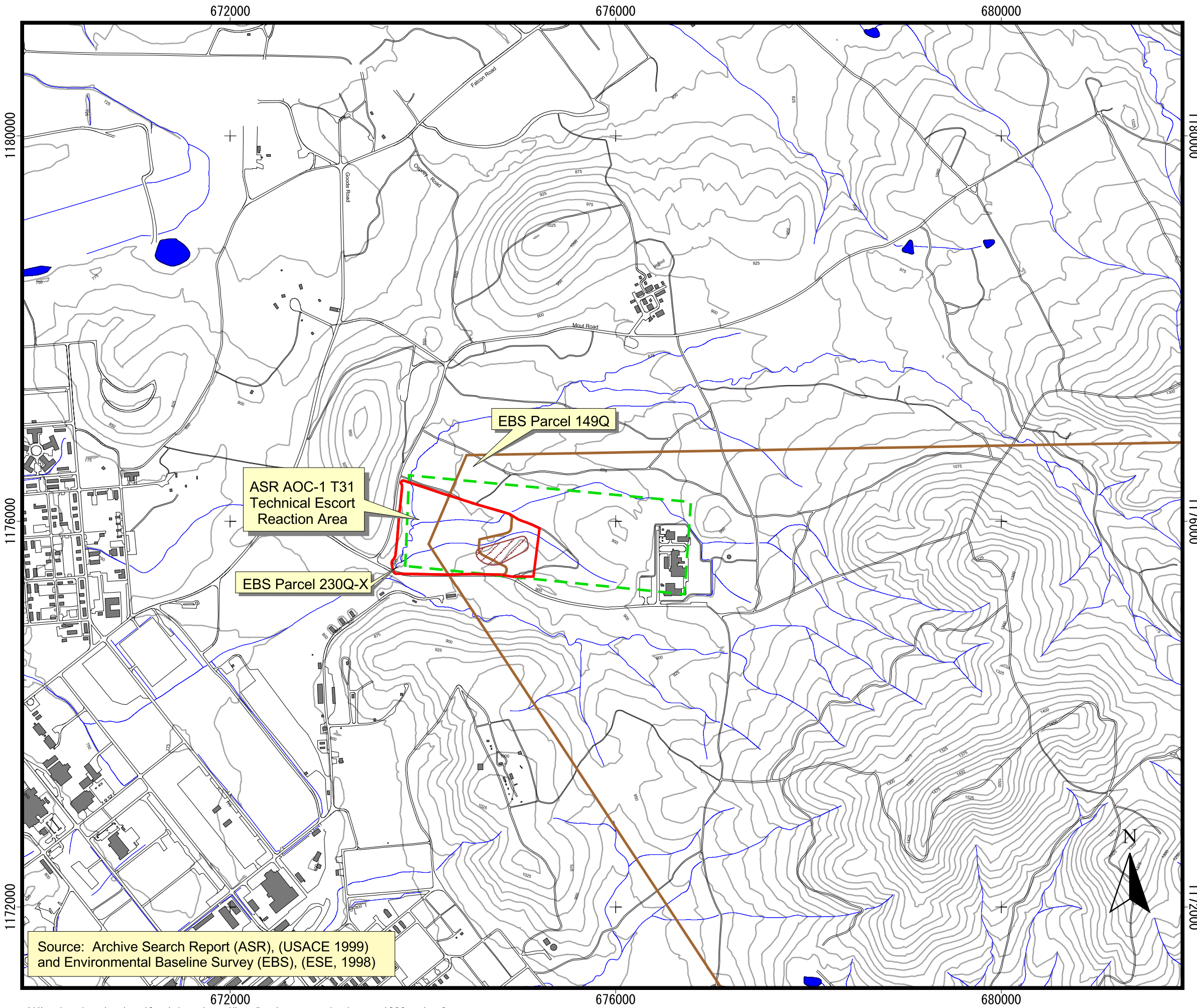


Figure 1-5

ASR Plate 8 (Chemical School Ranges and Training Areas) Range Location Map

Former 37mm Antitank
Range, Parcel 230Q-X and
Former Rifle Range,
Parcel 149Q
Fort McClellan, Alabama

Legend

- Area of Investigation
- EBS Parcel
- ASR AOC-1 T31
Technical Escort
Reaction Area
- Roads
- Streams
- Topographic Contours
25-foot Interval
- Buildings
- Lakes/Ponds
- Impact Area

1000 0 1000 Feet

NAD83 State Plane Coordinates

Contract No. DACA21-96-D-0018

1.2.2 Aerial Photographs

Available aerial photographs were reviewed for land-use activity in the study area. The following is a summary of the review of available aerial photographs of the study area.

1937 and 1940. The study area is completely wooded and bounded by unimproved roads.

1944. The study area has been cleared of trees and measures approximately 1,000 feet north to south by 1,200 feet east to west (Figure 1-6). A large barren area is noted in the northeast portion of the Parcel 230Q-X.

1954. The cleared area extends east beyond the 1944 eastern boundary for Parcel 230Q-X and is bounded by unimproved roads. The western half is wooded, and the north-central portion of the parcel appears barren. No other surface features are readily discernible.

1961. The features are very similar to those of the 1954 aerial photograph, with the exception of an elongated bare spot, possibly related to the Fill Area North of Landfill No. 2, Parcel 230(7) (Figure 1-7). Also noted is a cleared area east of the parcel boundary of the Former 37mm Antitank Range that could be the impact area noted by ESE.

1969. There appears to be little or no activity shown (Figure 1-8). Vegetation covers the majority of the parcel. A roughly circular bare area is noted along the north central boundary. The elongated bare area at the western boundary is still visible. Another, smaller bare spot is located in the downrange area in the southeastern portion of the parcel.

1976, 1982, 1994, and 1998. These aerial photographs show a steady increase in the amount of cover for the area of investigation.

Soil Types. Soils at the Former Antitank Range and Former Rifle Range fall mainly into three mapping units: Atkins silt loam, 0 to 2 percent slopes (AkA) in the eastern portion of the range; Jefferson gravelly fine sandy loam, 2 to 6 percent slopes, eroded (JeB2) in the north-central to northwestern portion of the range; and the Anniston gravelly clay loam, 6 to 10 percent slopes, severely eroded (AbC3) in the south-central to southwestern portion of the range (U.S. Department of Agriculture [USDA], 1961).

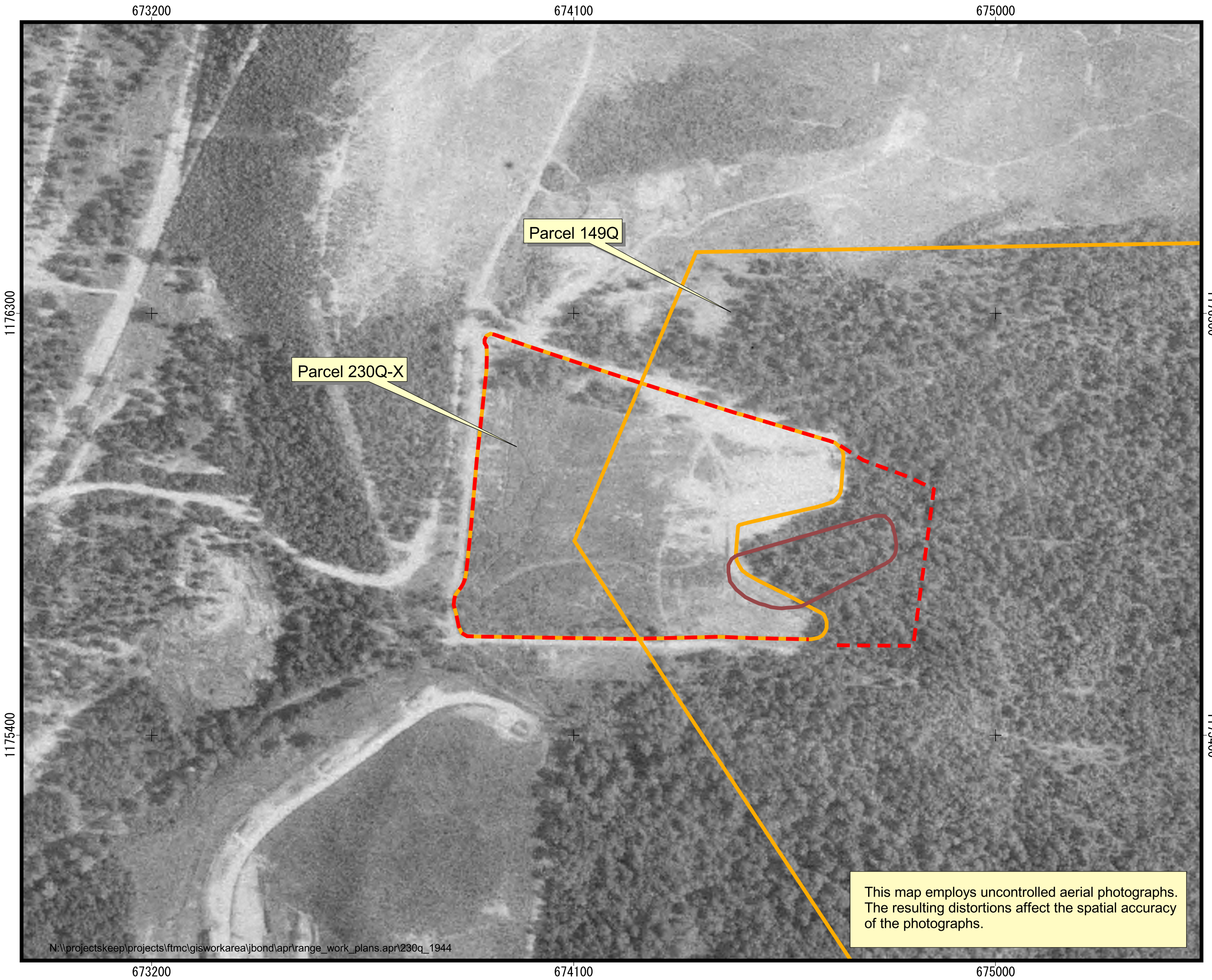


Figure 1-6

1944 Aerial Photograph

Former 37mm Antitank Range, Parcel 230Q-X
and Former Rifle Range, Parcel 149Q
Fort McClellan, AL

Legend

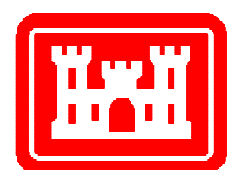
Area of Investigation

Parcel Boundary/
Range Safety Fan

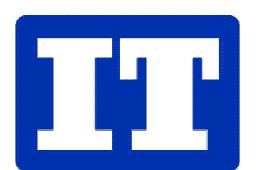
Impact Area

0 300 Feet

NAD83 State Plane Coordinates



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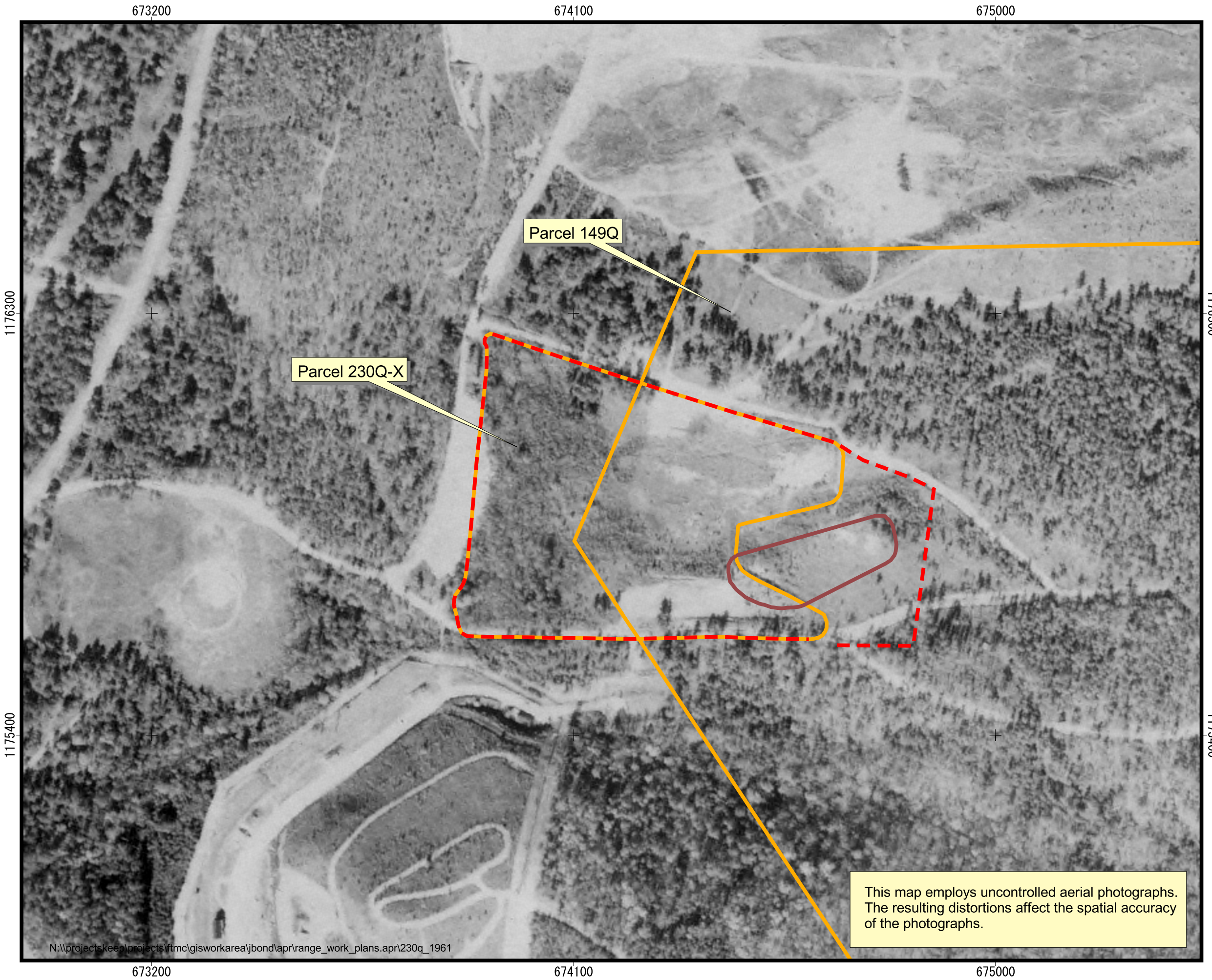


Figure 1-7

1961 Aerial Photograph

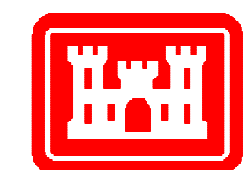
Former 37mm Antitank Range, Parcel 230Q-X and Former Rifle Range, Parcel 149Q Fort McClellan, AL

Legend

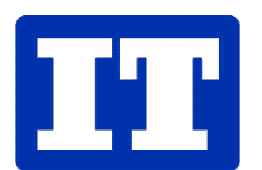
- Area of Investigation
- Parcel Boundary/Range Safety Fan
- Impact Area

0 300 Feet

NAD83 State Plane Coordinates

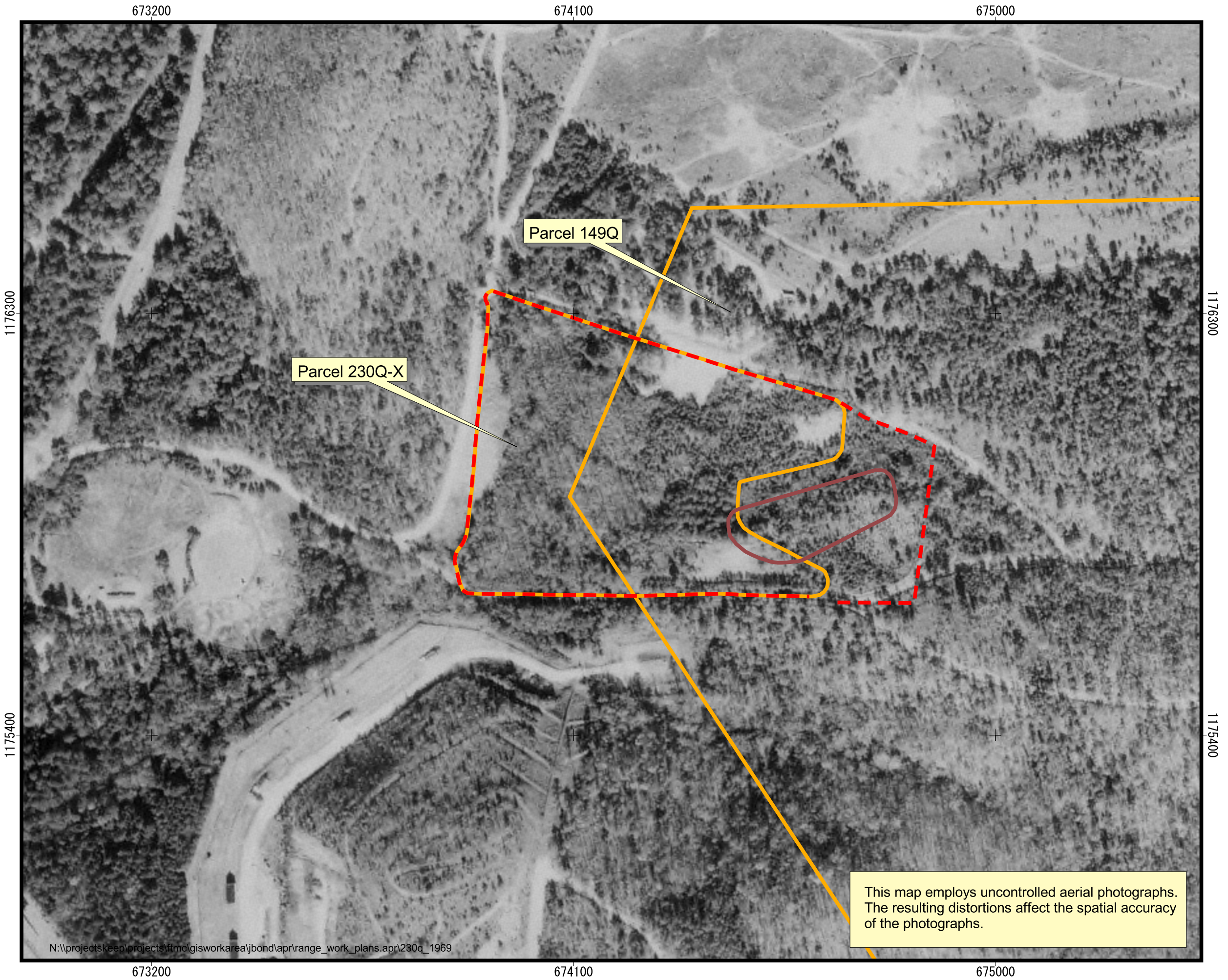


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N:\\projects\\keep\\projects\\fimo\\gisworkarea\\jbond\\apr\\range_work_plans.apr\\230q_1969

Figure 1-8

1969 Aerial Photograph

Former 37mm Antitank
Range, Parcel 230Q-X
and Former Rifle
Range, Parcel 149Q
Fort McClellan, AL

Legend

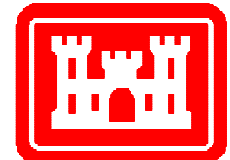
Area of Investigation

Parcel Boundary/
Range Safety Fan

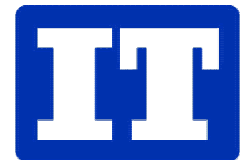
Impact Area

0300 Feet

NAD83 State Plane Coordinates



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The Atkins series consists of poorly drained, strongly acidic soils that are developing in general alluvium. This parent material has washed mainly from soils underlain by sandstone and shale. The Atkins soils occur mainly in small, narrow bands on floodplains along many of the streams in the county. They are flooded part of the time, and they generally vary in texture because they receive new deposits of alluvium. Atkins soils are high in organic matter. Depth to bedrock in the Atkins series is typically from 2 feet to greater than 10 feet, with depth to water greater than 20 feet (USDA, 1961).

The Jefferson series consists of well-drained, strongly acidic soils that occur in small areas on fans and on foot slopes in the Choccolocco, Colvin, and Coldwater Mountains. These soils have developed from old local alluvium that washed or sloughed from ridges of sandstone, shale, and Weisner quartzite. Fragments of sandstone and quartzite, as much as 8 inches in diameter, are on the surface and throughout the profile (USDA, 1961). Bedrock is generally encountered from 2 feet to greater than 10 feet below ground surface (bgs), with depth to water greater than 20 feet (USDA, 1961).

The Anniston series of soils consists of strongly acidic, deep, well-drained soils that have developed in old local alluvium. The parent material washed from the adjacent, higher-lying Linker, Muskingum, Enders, and Montevallo soils, which developed from weathered sandstone, shale, and quartzite. Sandstone and quartzite gravel and cobbles, measuring as much as 8 inches in diameter, are common throughout the soil. For this soil series, the depth to bedrock is typically from 2 feet to greater than 10 feet, with depth to water greater than 20 feet (USDA, 1961).

Atkins silt loam, 0 to 2 percent slopes (AkA) consists of a poorly drained, friable, low-producing soil that is developing in alluvium on first bottom. The Atkins soils have a dark grayish-brown, mottled silt loam surface soil. The subsoil is light brownish-gray to light olive-gray, mottled silt loam or clay loam. Runoff is very slow, and the soil is flooded after prolonged rainfall or heavy rains of short duration. Infiltration is medium to slow, and permeability is slow. The capacity for available moisture is high (USDA, 1961).

Jefferson gravelly fine sandy loam, 2 to 6 percent slopes, eroded (JeB2) consists of a friable soil that has developed from old local alluvium on foot slopes and fans along the bases of ridges and mountains. The surface soil is dark grayish-brown fine sandy loam, and the subsoil is yellowish-

brown, light fine sandy clay. Runoff and infiltration are medium. Permeability is moderate, and the capacity for available moisture is high (USDA, 1961).

Anniston gravelly clay loam, 6 to 10 percent slopes, severely eroded (AbC3) consists of areas that formerly were Anniston gravelly loam or Allen gravelly loam that have lost nearly all of their original surface soil through erosion. The subsoil is reddish-brown to dark reddish-brown gravelly clay loam. This area has many small, shallow gullies and a few deep ones. Infiltration is moderately slow, and the capacity for available moisture is low (USDA, 1961).

1.3 Scope of Work

The scope of work for activities associated with the SI at the Former 37mm Antitank Range and Former Rifle Range, as specified by the statement of work (USACE, 1999a), includes the following tasks:

- Develop the SFSP attachment.
- Develop the SSHP attachment.
- Develop the UXO safety plan attachment.
- Conduct a surface and near-surface UXO survey over all areas to be included in the sampling effort.
- Provide downhole UXO support for all intrusive drilling to determine buried downhole hazards.
- Collect 13 surface soil samples, 13 subsurface soil samples, 3 groundwater samples, 2 sediment samples, and 2 surface water samples to determine whether potential site-specific chemicals (PSSC) are present and to provide data useful for supporting any future planned corrective measures and closure activities.
- Analyze samples for the parameters listed in Section 4.5.

Because an impact area is located within the study area and the surrounding parcels have been used as impact areas, the potential exists for UXO at the Former 37mm Antitank Range and the Former Rifle Range. Therefore, UXO surface sweeps and downhole surveys of soil borings will be required to support field activities at this site. The surface sweeps and downhole surveys will be conducted to identify anomalies for the purpose of UXO avoidance. The site-specific UXO safety plan attachment addresses the manner in which the avoidance will be conducted.

At completion of the field activities and sample analyses (as listed in Section 4.5), an SI summary report will be prepared to evaluate the absence or presence of PSSCs at this site and to recommend further actions, if appropriate. The SI summary report will be prepared in accordance with current guidelines of the U.S. Environmental Protection Agency (EPA), Region IV, and the Alabama Department of Environmental Management (ADEM).

2.0 Summary of Existing Environmental Studies

2.1 Environmental Baseline Survey

ESE conducted the EBS in 1998 to document current environmental conditions of all FTMC property. The study was to identify sites that, based on available information, have no history of contamination and comply with U.S. Department of Defense guidance for fast-track cleanup at closing installations. The EBS includes a baseline picture of FTMC properties by identifying and categorizing the properties by the following seven criteria:

1. Areas where no storage, release, or disposal of hazardous substances or petroleum products has occurred (including no migration of these substances from adjacent areas)
2. Areas where only release or disposal of petroleum products has occurred
3. Areas where release, disposal, and/or migration of hazardous substances has occurred, but at concentrations that do not require a removal or remedial response
4. Areas where release, disposal, and/or migration of hazardous substances has occurred, and all removal or remedial actions to protect human health and the environment have been taken
5. Areas where release, disposal, and/or migration of hazardous substances has occurred, and removal or remedial actions are underway, but all required remedial actions have not yet been taken
6. Areas where release, disposal, and/or migration of hazardous substances has occurred, but required actions have not yet been implemented
7. Areas that are not evaluated or require further evaluation.

For non-Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) environmental or safety issues, the parcel label includes the following components: a unique non-CERCLA issue number, the letter "Q" designating the parcel as a Community Environmental Response Facilitation Act (CERFA) Category 1 Qualified Parcel, and the code for the specific non-CERCLA issue(s) present (ESE, 1998). The non-CERCLA issue codes used are:

- A = Asbestos (in buildings)
- L = Lead-based paint (in buildings)
- P = Polychlorinated biphenyls

- R = Radon (in buildings)
- RD = Radionuclides/radiological issues
- X = UXO
- CWM = Chemical warfare material.

The EBS was conducted in accordance with the CERFA protocols (CERFA-Public Law 102-426) and U.S. Department of Defense policy regarding contamination assessment. Record searches and reviews were performed on all reasonably available documents from FTMC, ADEM, EPA Region IV, and Calhoun County, as well as a database search of CERCLA-regulated substances, petroleum products, and Resource Conservation and Recovery Act-regulated facilities. Available historical maps and aerial photographs were reviewed to document historical land uses. Personal and telephone interviews of past and present FTMC employees and military personnel were conducted. In addition, visual site inspections were conducted to verify conditions of specific property parcels.

The Former 37mm Antitank Range, Parcel 230Q-X, and the Former Rifle Range, Parcel 149Q, were identified as Category 1 CERFA sites. These CERFA sites are parcels where no known or recorded storage, release, or disposal (including migration) has occurred on site property. Also, Former 37mm Antitank Range was qualified “X” for potential UXO at the range. Because these sites were active ranges, the Former 37mm Antitank Range, Parcel 230Q-X, and the Former Rifle Range, Parcel 149Q, require additional evaluation to determine the environmental condition of the parcels.

2.2 Previous Site Investigations

Fill Area North of Landfill No. 2. Fill Area North of Landfill No. 2, Parcel 230(7), is located west of the area of investigation. A small portion of Parcel 230(7) overlaps the western area of this investigation.

IT conducted an SI in 1999 at the Fill Area North of Landfill No. 2, which included a geophysical survey, environmental sampling and analysis, and monitoring well installation activities. Geophysical data indicated several landfill pits that revealed low to moderate concentrations of buried metal and numerous isolated buried metallic objects/debris within the site boundaries. The total area surveyed was approximately 2.7 acres (IT, 2001).

Three temporary groundwater monitoring wells and seven soil borings were installed at the Fill Area North of Landfill No. 2. Groundwater elevations and well construction from the SI at Parcel 230(7) data are presented in Table 2-1 and Table 2-2, respectively. Samples collected for analysis included seven surface soil and seven subsurface soil samples, three sediment and three surface water samples, three depositional soil samples, and three groundwater samples. All samples were analyzed as part of the investigation. Complete analytical results can be found in the fill area definition report (IT, 2001).

Training Area T-31, Parcels 184(7) and 185(7). Training Area T-31, Parcel 184(7) is located north of the area of investigation. Most of Parcel 185(7) is located within the parcel boundaries of the area of this investigation.

IT conducted an SI in 2001 at Parcel 185(7) which included the installation of two permanent groundwater monitoring wells and the collection of two surface and subsurface soil samples, two depositional soil samples, two surface water and sediment samples, and two groundwater samples. Groundwater elevations and well construction data are presented in Table 2-1 and Table 2-2, respectively. All samples were analyzed as part of the investigation. Analytical results have not yet been completed.

Training Area T-31 is a former toxic training area used between 1957 and 1969 for training with small quantities of sarin and distilled mustard (Roy F. Weston, Inc., 1990) and storage of unknown types of chemical agent (Parsons Engineering Science, Inc., 1999). Chemical analysis of soil, surface water, and sediment samples from high-probability locations at Training Area T-31 did not detect the presence of chemical agent or breakdown products at the area (Science Applications International Corporation, 1993).

2.3 Fill Area Definition at Parcel 230(7)

Five exploratory trenches were excavated at Parcel 230(7) to characterize the horizontal and vertical extent of the fill area. A remote-controlled excavator was used for the trenching because of the potential for UXO. Trenches were excavated to depths ranging from 2 to 7 feet bgs. The average depth of fill material estimated from the trench and boring log data is approximately 15 feet bgs (IT, 2001).

Fill materials observed in the trenches included: metal bars/pipes, wiring, glass bottles/jars, red bricks, a black clay pipe, a piece of 100-pound concrete bomb, ceramic pieces, cement blocks,

Table 2-1

**Groundwater Elevations, Parcels 230(7) and 185(7)
Site Investigation at Former 37mm Antitank Range, Parcel 230Q-X, and Former Rifle Range, Parcel 149Q
Fort McClellan, Calhoun County, Alabama**

Well Location	Measurement Date	Depth to Water (ft BTOC)	Reference Elevation (ft amsl)	Ground Elevation (ft amsl)	Water Elevation (ft amsl)
PPMP-230-GP01	8-Jan-02	3.83	805.12	803.45	801.29
PPMP-230-GP02	8-Jan-02	3.66	812.17	811.12	808.51
PPMP-230-GP03	8-Jan-02	4.63	814.24	812.12	809.61
CWM-185-MW01	8-Jan-02	5.92	822.19	820.26	816.27
CWM-185-MW02	8-Jan-02	5.14	821.24	821.95	816.10

Elevations referenced to the *North American Vertical Datum* of 1988.

amsl - Above mean sea level.

BTOC - Below top of casing.

ft - Feet.

Table 2-2

**Well Construction Data, Parcels 230(7) and 185(7)
Site Investigation at Former 37mm Antitank Range, Parcel 230Q-X,
and Former Rifle Range, Parcel 149Q
Fort McClellan, Calhoun County, Alabama**

Well Location	Northing	Easting	Ground Elevation (ft amsl)	TOC Elevation (ft amsl)	Total Depth (ft bgs)	Screen Length (ft bgs)	Screen Interval (ft bgs)
PPMP-230-GP01	1175663.522	6373754.236	803.45	805.12	5	3.3	1 - 4.3
PPMP-230-GP02	1176089.466	673868.044	811.12	812.17	14.3	10	4 - 14
PPMP-230-GP03	1176188.642	673865.27	812.12	814.24	8.45	5	3.2 - 8.2
CWM-185-MW01	1176139.01	674086.35	820.26	822.19	25	15	10 - 25
CWM-185-MW02	1176193.20	674018.53	821.95	821.24	20	10	10 - 20

Wells were installed using a 4.25-inch inside-diameter hollow-stem auger with 2-inch ID schedule 40 PVC riser and screen.

Coordinates were referenced to the U.S. Plane Coordinate System, Alabama East Zone, *North American Datum*, 1983.

Elevations referenced to the *North American Vertical Datum* of 1988.

amsl - Above mean sea level.

bgs - Below ground surface.

BTOC - Below top of casing.

ft - Feet.

metal u-rings, pieces of a 55-gallon metal drum, gravel, asphalt, burned wood, burned newspaper, and tin foil (IT, 2001).

Based on the results of the exploratory trenching at Parcel 230(7), the horizontal extent of the fill area has been defined. The approximate extent of the fill area at Parcel 230(7) covers 2.4 acres (IT, 2001).

3.0 Site-Specific Data Quality Objectives

3.1 Overview

The data quality objective (DQO) process is followed to establish data requirements. This process ensures that the proper quantity and quality of data are generated to support the decision-making process associated with the action selection for Former 37mm Antitank Range, Parcel 230Q-X, and Former Rifle Range, Parcel 149Q. This section incorporates the components of the DQO process described in the publication EPA 600/R-96/005, *Guidance for the Data Quality Objectives Process* (EPA, 2000). The DQO process as applied to Former 37mm Antitank Range and Former Rifle Range is described in more detail in Section 3.4 of this SFSP. Table 3-1 provides a summary of the factors used to determine the appropriate quantity of samples and the procedures necessary to meet the objectives of the SI and to establish a basis for future action at this site.

The samples will be analyzed using EPA SW-846 methods, including Update III Methods where applicable, as presented in Chapter 4.0 in this SFSP and Chapter 5.0 of the QAP. Data will be reported in accordance with definitive data requirements of Chapter 2 of the USACE Engineering Manual 200-1-6, *Chemical Quality Assurance For Hazardous, Toxic and Radioactive Waste (HTRW) Projects* (USACE, 1997) and evaluated by the stipulated requirements for the generation of definitive data (Section 7.2.2 of the QAP). Chemical data will be reported by the laboratory via hard-copy data packages using Contract Laboratory Program-like forms, along with electronic copies. These packages will be validated in accordance with EPA National Functional Guidelines by Level III criteria.

3.2 Data Users and Available Data

The available data related to the SI at Former 37mm Antitank Range and Former Rifle Range, presented in Table 3-1, have been used to formulate a site-specific conceptual model. This conceptual model was developed to support the development of this SFSP, which is necessary to meet the objectives of these activities and to establish a basis for future action at the site. The data users for the data and information generated during field activities are primarily EPA, USACE, ADEM, FTMC, and other USACE supporting contractors. This SFSP, along with the necessary companion documents, has been designed to provide the regulatory agencies with sufficient detail to reach a determination as to the adequacy of the scope of work. The program has also been designed to provide the level of defensible data and information required to confirm or rule out the existence of residual chemical contamination in site media.

Table 3-1

Summary of Data Quality Objectives
Former 37mm Antitank Range, Parcel 230Q-X ,
and Former Rifle Range, Parcel 149Q
Site Investigation
Fort McClellan, Calhoun County, Alabama

Users	Available Data	Conceptual Site Model	Media of Concern	Data Uses and Objectives	Data Types	Analytical Level	Data Quantity
EPA, ADEM, USACE, DOD, FTMC, IT Corporation, other contractors, and possible future land users	None	<u>Contaminant Source</u> Parcel 230Q-X and Parcel 149Q (explosives and metals)	<u>Surface soil</u>	SI to confirm the presence or absence of contamination in the site media	<u>Surface soil</u> TAL Metals, Nitroaromatic and Nitramine Explosives; Plus 10% of Sample Types for TCL VOCs, TCL SVOCs, CI Pesticides, OP Pesticides, and CI Herbicides	Definitive data in data packages (as defined in USACE EM200-1-6)	13 surface soil samples + QC
		<u>Migration Pathways</u> Rain runoff and erosion to surface soil, infiltration and leaching to subsurface soil and groundwater, dust emissions and volatilization to ambient air, groundwater discharge to surface water, surface water runoff and erosion to surface water and sediment, and biotransfer to venison.	<u>Subsurface Soil</u>		<u>Subsurface Soil</u> TAL Metals, Nitroaromatic and Nitramine Explosives; Plus 10% of Sample Types for TCL VOCs, TCL SVOCs, CI Pesticides, OP Pesticides, and CI Herbicides	Definitive data in data packages (as defined in USACE EM200-1-6)	13 subsurface soil samples + QC
			<u>Groundwater</u>	Definitive quality data for future decision-making	<u>Groundwater</u> TAL Metals, Nitroaromatic and Nitramine Explosives; Plus 10% of Sample Types for TCL VOCs, TCL SVOCs, CI Pesticides, OP Pesticides, and CI Herbicides	Definitive data in data packages (as defined in USACE EM200-1-6)	3 groundwater samples + QC
			<u>Surface Water</u>		<u>Surface Water</u> TAL Metals, Nitroaromatic and Nitramine Explosives; Plus 10% of Sample Types for TCL VOCs, TCL SVOCs, CI Pesticides, OP Pesticides, and CI Herbicides	Definitive data in data packages (as defined in USACE EM200-1-6)	2 surface water samples + QC
			<u>Sediment</u>		<u>Sediment</u> TAL Metals, Nitroaromatic and Nitramine Explosives, TOC, Grain Size; Plus 10% of Sample Types for TCL VOCs, TCL SVOCs, CI Pesticides, OP Pesticides, and CI Herbicides	Definitive data in data packages (as defined in USACE EM200-1-6)	2 sediment samples + QC
		<u>Potential Receptors</u> Recreational site user (current and future) Resident (future)					
		<u>PSSC</u> metals, nitroexplosives, VOCs, SVOCs, herbicides, and pesticides					

ADEM - Alabama Department of Environmental Management.

CI - Chlorinated.

DOD - U.S. Department of Defense.

EM200-1-6 - USACE Engineering Manual, *Chemical Quality Assurance for HTRW Projects*, October 10, 1997.

EPA - U.S. Environmental Protection Agency.

FTMC - Fort McClellan.

OP - Organophosphorus.

PSSC - Potential site-specific chemical.

QC - Quality control.

SI - Site investigation.

SVOC - Semivolatile organic compounds.

TAL - Target analyte list.

TOC - Total organic carbon.

USACE - U.S. Army Corps of Engineers.

VOC - Volatile organic compounds.

3.3 Conceptual Site Exposure Model

The conceptual site exposure model (CSEM) provides the basis for identifying and evaluating potential risks to human health in the risk assessment. The CSEM includes all receptors and potential exposure pathways appropriate to all plausible scenarios. The CSEM facilitates consistent and comprehensive evaluation of risk to human health through graphically presenting all possible exposure pathways, including all sources, release and transport pathways, and exposure routes. In addition, the CSEM helps to ensure that potential pathways are not overlooked. The elements of a complete exposure pathway and CSEM are:

- Source (i.e., contaminated environmental) media
- Contaminant release mechanisms
- Contaminant transport pathways
- Receptors
- Exposure pathways.

Contaminant release mechanisms and transport pathways are not relevant for direct receptor contact with a contaminated source medium.

Primary contaminant release mechanisms were associated with training exercises (e.g., discharging lead and ordnance to the ground) and possibly through leaks and spills. Potential contaminant transport pathways include rain runoff and erosion to surface soil, infiltration and leaching to subsurface soil and groundwater, dust emissions and volatilization to ambient air, groundwater discharge to surface water, surface water runoff and erosion to surface water and sediment, and biotransfer to deer through browsing.

Most of the land within Parcels 230Q-X and 149Q is covered with trees and is currently not used by Base personnel. However, because the site is not fenced and is wooded, it is accessible to potential trespassers and may be used for hunting purposes. Therefore, the only plausible receptor evaluated under the current land-use scenario is the recreational site user who hunts. Fish ingestion will not be evaluated because the surface water is insufficient to support fish for consumption. The surface water and sediment at these parcels were previously evaluated, and no risk or hazard to the site recreational user was found. However, two surface water and sediment samples will be collected from Parcels 230Q-X and 149Q and the data will be evaluated. Potential receptor scenarios considered, but not included under current land-use scenarios, are as follows:

- **Groundskeeper.** The site is not currently maintained by a groundskeeper.
- **Construction Worker.** The site is unused, and no development or construction is occurring.
- **Resident.** The site is not currently used for residential purposes.

Future land use for the area of investigation is shown as part of the remediation reserve to be used for passive recreation (FTMC, 1997). Potential receptor scenarios evaluated for the future include the following:

- **Recreational Site User.** Because future land use is passive recreation, and hunting is a viable option, the recreational site user who hunts is included. Fish ingestion will not be evaluated because the surface water is insufficient to support fish for consumption. Surface water and sediment have already been evaluated for this receptor at an adjacent parcel for the same surface water stream (IT, 2001). However, additional surface water and sediment samples will be collected from Parcels 230Q-X and 149Q.
- **Resident.** Although the site is not expected to be utilized for residential purposes, the resident is considered in order to provide information for the project manager and regulators.

A summary of relevant contaminant release and transport mechanisms, source and exposure media, and receptor scenarios and exposure pathways for this site is provided in Table 3-1 and Figure 3-1.

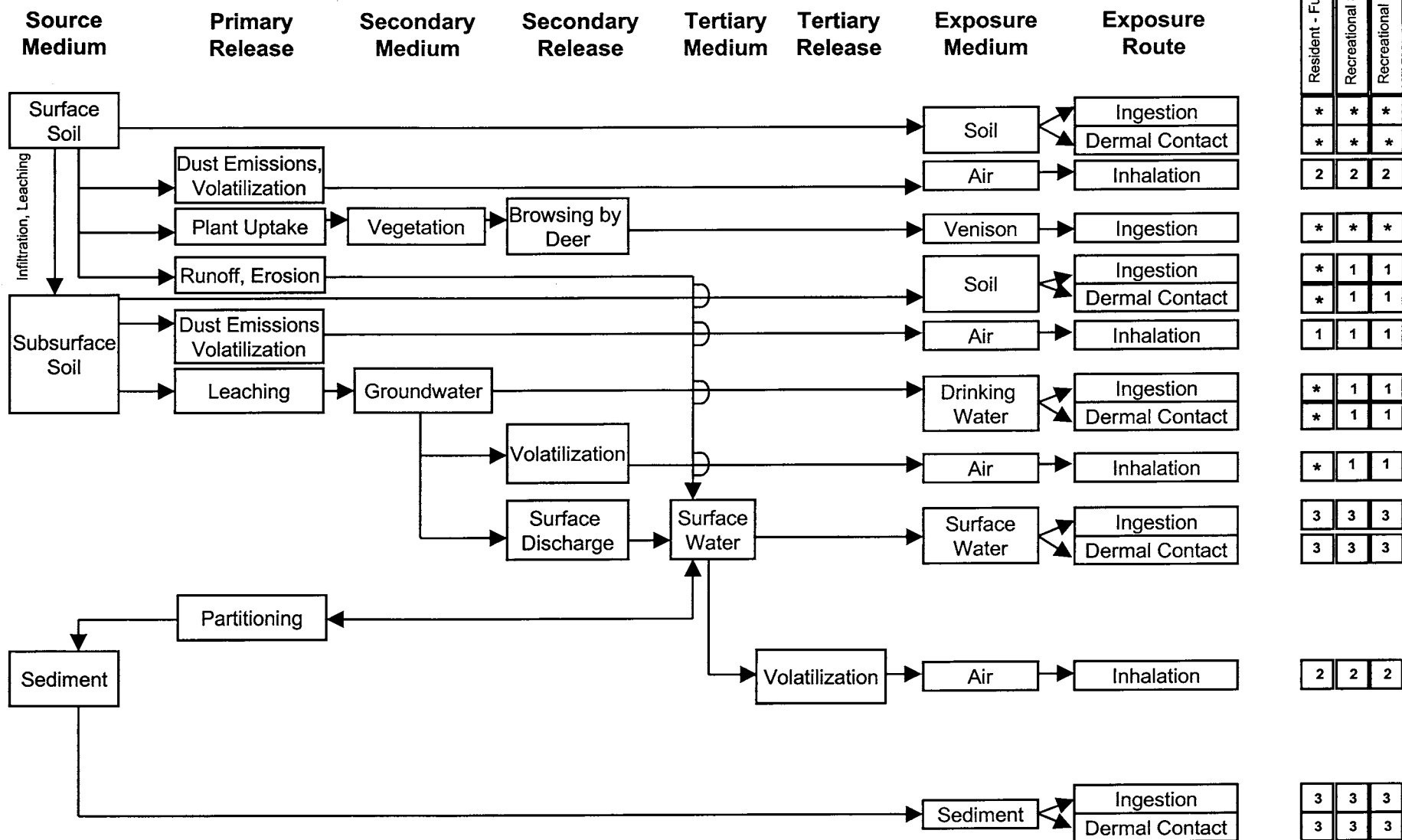
3.4 Decision-Making Process, Data Uses, and Needs

The seven-step decision-making process is presented in detail in Chapter 3.0 of the QAP and will be followed during the SI at Parcels 230Q-X and 149Q. Data uses and needs are summarized in Table 3-1.

3.4.1 Risk Evaluation

Confirmation of contamination at Parcels 230Q-X and 149Q will be based on using EPA definitive data to determine whether or not PSSCs are detected in site media. Results from these analyses will be compared with site-specific screening levels, ecological screening values, and background values to determine if PSSCs are present at the site at concentrations that pose an unacceptable risk to human health or the environment. Definitive data will be adequate for confirming the presence of site contamination and for supporting a feasibility study and risk assessment.

Figure 3-1
Human Health Conceptual Site Exposure Model
Former 37mm Antitank Range, Parcel 230Q-X, and Former Rifle Range, Parcel 149Q
Fort McClellan, Alabama



* = Complete exposure pathway evaluated in the streamlined risk assessment.

1 = Incomplete exposure pathway.

2 = Although theoretically complete, this pathway is judged to be insignificant and is not evaluated in the streamlined risk assessment.

3 = Risk and hazard for these receptors in surface water and sediment were previously evaluated in the *Fill Area Engineering Evaluation/Cost Analysis Parcels 78(6), 79(6), 80(6), 81(5), 175(5), 230(7), 227(7), 126(7) 229(7), 231(7), 233(7), and 82(7), Fort McClellan, Calhoun County, Alabama*, IT Corporation, August 2001. Parcel 230(7) has same surface water as Parcel 230Q-X.

Assessment of potential ecological risk associated with sites or parcels (e.g., surface water and sediment sampling, specific ecological assessment methods) will be addressed in accordance with the procedures in Section 5.3 of the WP (IT, 2002b).

3.4.2 Data Types and Quality

Surface soil, subsurface soil, surface water, sediment, and groundwater will be sampled and analyzed to meet the objectives of the SI at Parcels 230Q-X and 149Q. Quality assurance/quality control (QA/QC) samples will be collected for all sample matrices, as described in Chapter 4.0 of this SFSP. Samples will be analyzed by EPA-approved SW-846 Methods Update III, where available; comply with EPA definitive data requirements; and be reported using hard-copy data packages. In addition to meeting the quality needs of this SI, data analyzed at this level of quality are appropriate for all phases of site characterization, remedial investigation, and risk assessment.

3.4.3 Precision, Accuracy, and Completeness

Laboratory requirements of precision, accuracy, and completeness for this SI are provided in Section 3.3 and presented in Chapter 5.0 of the QAP (IT, 2002a).

4.0 Field Activities

4.1 UXO Survey Requirements and Utility Clearances

An impact area was noted by ESE at the east end of the area of investigation. Therefore, IT will conduct UXO avoidance activities, including surface sweeps and downhole surveys of soil borings. The site-specific UXO safety plan provides technical guidance for ordnance and explosives avoidance for sample collection activities. The site-specific UXO safety plan attachment has been written in conjunction with Appendix E of the SAP (IT, 2002a).

4.1.1 Surface UXO Survey

A UXO sweep will be conducted over areas that will be included in the sampling and surveying activities to identify UXO on or near the surface that may present a hazard to on-site workers during field activities. Low-sensitivity magnetometers will be used to locate surface and shallow-buried metal objects. UXO located on the surface will be identified and conspicuously marked for easy avoidance. Subsurface metallic anomalies will not be disturbed, but will also be marked for easy avoidance. UXO personnel requirements, procedures, and detailed descriptions of the geophysical equipment to be used are provided in Appendix E of the approved SAP (IT, 2002a).

4.1.2 Downhole UXO Survey

During the soil boring and downhole sampling, downhole UXO surveys will be performed to determine if buried metallic objects are present. UXO monitoring, as described in Appendix E of the SAP (IT, 2002a), will continue until undisturbed soil is encountered or the borehole has been advanced to 12 feet bgs, whichever is reached first.

4.1.3 Utility Clearances

After the UXO surface survey has cleared the area to be sampled and prior to performing any intrusive sampling, a utility clearance will be performed at locations where soil and groundwater samples will be collected, using the procedure outlined in Section 4.2 of the SAP (IT, 2002a). The site manager will mark the proposed locations with stakes, coordinate with the local utility companies to clear the proposed locations for utilities, and obtain digging permits. Once the locations are approved (for both UXO and utility avoidance) for intrusive sampling, the stakes will be labeled as cleared.

4.2 Environmental Sampling

The environmental sampling program at the Former 37mm Antitank Range and the Former Rifle Range includes the collection of surface soil, subsurface soil, surface water, sediment, and groundwater samples for chemical analysis. These samples will be collected and analyzed to provide data for characterizing the site to determine the environmental condition of the site and any further action to be conducted. Additionally, samples will be collected from environmental media in locations that will assist in the assessment of potential ecological impacts resulting from activities at the site.

4.2.1 Surface Soil Sampling

Surface soil samples will be collected from 13 locations at the Former 37mm Antitank Range and the Former Rifle Range.

4.2.1.1 Sample Locations and Rationale

The sampling rationale for each surface soil sample location is listed in Table 4-1. Proposed sampling locations are shown in Figure 4-1. Surface soil sample designations and QA/QC sample requirements are summarized in Table 4-2. The final soil boring sampling locations will be determined in the field by the on-site geologist, based on actual field conditions.

4.2.1.2 Sample Collection

Surface soil samples will be collected from the upper 1 foot of soil by direct-push methodology as specified in Section 5.1.1.1 of the SAP (IT, 2002a). In areas where site access does not permit the use of a direct-push rig, the samples will be collected using a stainless steel hand auger as specified in Section 5.1.1.2 and Section 6.1.1.1 of the SAP. Collected soil samples will be screened using a photoionization detector (PID) in accordance with Section 6.8.3 of the SAP. Surface soil samples will be screened for information purposes only, not to aid in the selection of samples for analysis. Sample containers, sample volumes, preservatives, and holding times for the analyses required in this SFSP are discussed in Chapter 4.0 and listed in Table 4-1 of the QAP. Sample documentation and chain-of-custody (COC) will be recorded as specified in Chapter 6.0 of the SAP. The samples will be analyzed for the parameters listed in Section 4.5 of this SFSP.

4.2.2 Subsurface Soil Sampling

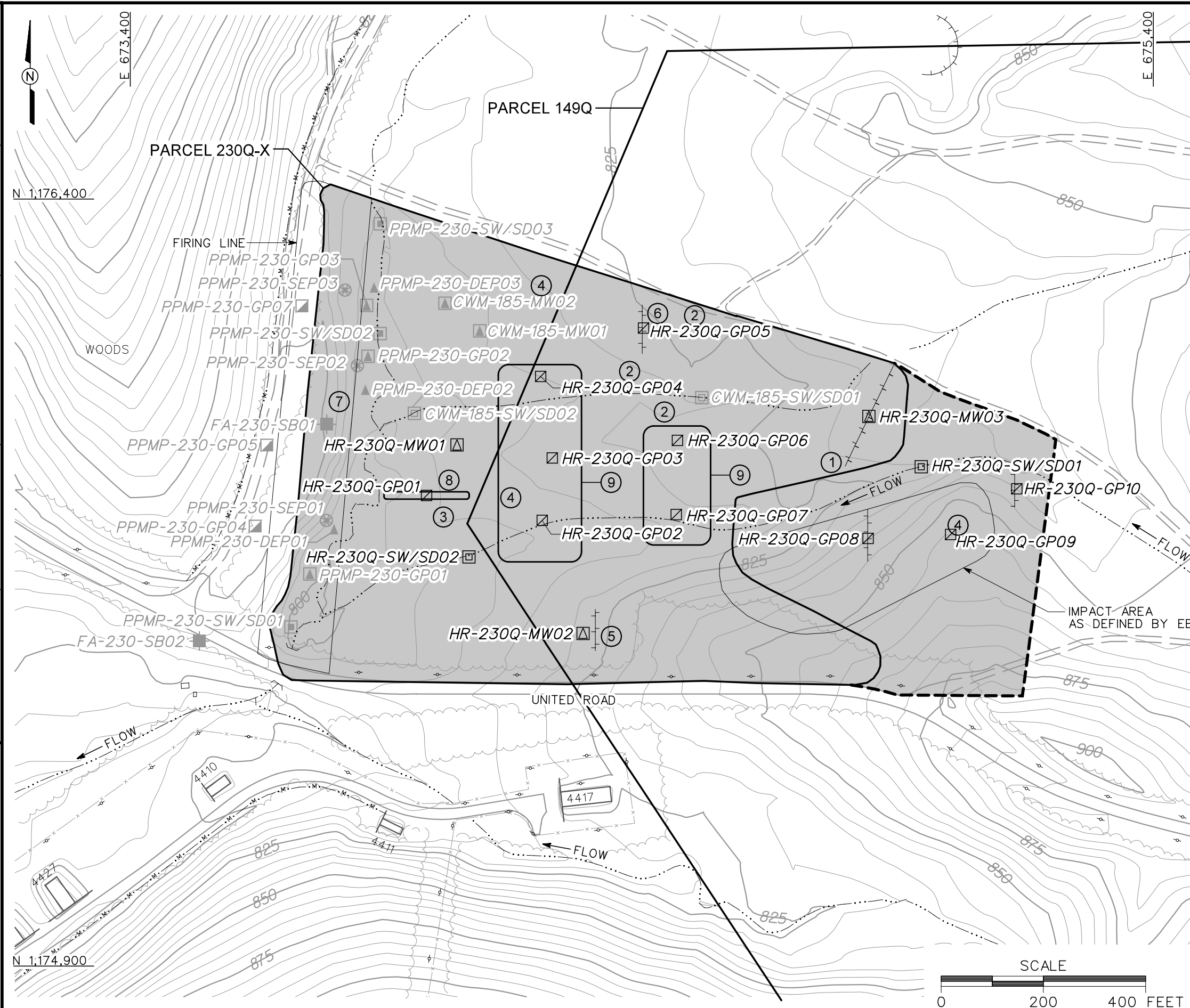
Subsurface soil samples will be collected from 13 borings installed at the Former 37mm Antitank Range and the Former Rifle Range.

Table 4-1

**Sampling Locations and Rationale
Former Antitank Range, Parcel 230Q-X,
and Former Rifle Range, Parcel 149Q
Fort McClellan, Calhoun County, Alabama**

Parcel Number	Sample Location	Sample Media	Sample Location Rationale
230Q-X and 149Q	HR-230Q-MW01	Surface soil subsurface soil and groundwater	Soil boring for surface soil and subsurface soil, and groundwater samples to be placed downslope of the pop-up targets in the mid-range area. Sample data will indicate if contaminant releases into the environment have occurred from former activities at this area of the site and if contaminated soil exists at this location. Soil sample data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes. The monitoring well location will be used to establish a local groundwater flow direction and site-specific geology, and provide information on groundwater quality in the residuum aquifer.
	HR-230Q-MW02	Surface soil subsurface soil and groundwater	Soil boring for surface and subsurface soil to be placed directly in the berm located in the south-central section of the former range. Monitoring well for groundwater samples to be located adjacent and downslope of the berm. Sample data will indicate if contaminant releases into the environment have occurred from former activities at this area of the site and if contaminated soil exists at this location. Soil sample data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes. The monitoring well location will be used to establish a local groundwater flow direction and site-specific geology, and provide information on groundwater quality in the residuum aquifer.
	HR-230Q-MW03	Surface soil subsurface soil and groundwater	Soil boring for surface and subsurface soil samples are to be located in the berm at the northeasternmost corner of the parcel. Monitoring well for groundwater samples to be located immediately adjacent and downslope of the berm. Sample data will indicate if contaminant releases into the environment have occurred from former activities at this area of the site and if contaminated soil exists at this location. Soil sample data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes. The monitoring well location will be used to establish a local groundwater flow direction and site-specific geology, and provide information on groundwater quality in the residuum aquifer.
	HR-230Q-GP01	Surface soil and subsurface soil	Soil boring for surface soil and subsurface soil samples to be located in the trench located near the former firing line. Sample data will indicate if contaminant releases into the environment have occurred from former activities at this area of the site and if contaminated soil exists at this location. Soil sample data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes.
	HR-230Q-GP02	Surface soil and subsurface soil	Soil boring for surface soil and subsurface soil samples at one of the southernmost pop-up targets in this mid-range area. Samples are to be collected adjacent to the target. Sample data will indicate if contaminant releases into the environment have occurred from former activities at this area of the site and if contaminated soil exists at this location. Soil sample data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes.
	HR-230Q-GP03	Surface soil and subsurface soil	Soil boring for surface soil and subsurface soil samples at one of the centrally located pop-up targets in this mid-range area. Samples are to be collected adjacent to the target. Sample data will indicate if contaminant releases into the environment have occurred from former activities at this area of the site and if contaminated soil exists at this location. Soil sample data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes.
	HR-230Q-GP04	Surface soil and subsurface soil	Soil boring for surface soil and subsurface soil samples at one of the northernmost pop-up targets in this mid-range area. Samples are to be collected adjacent to the target. Sample data will indicate if contaminant releases into the environment have occurred from former activities at this area of the site and if contaminated soil exists at this location. Soil sample data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes.
	HR-230Q-GP05	Surface soil and subsurface soil	Soil boring for surface soil and subsurface soil samples in the berm located at the north-central parcel boundary. Sample data will indicate if contaminant releases into the environment have occurred from former activities at this area of the site and if contaminated soil exists at this location. Soil sample data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes.
	HR-230Q-GP06	Surface soil and subsurface soil	Soil boring for surface soil and subsurface soil samples at one of the northernmost pop-up targets in this down-range area. Samples are to be collected adjacent to the target. Sample data will indicate if contaminant releases into the environment have occurred from former activities at this area of the site and if contaminated soil exists at this location. Soil sample data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes.
	HR-230Q-GP07	Surface soil and subsurface soil	Soil boring for surface soil and subsurface soil samples at one of the southernmost pop-up targets in this down-range area. Samples are to be collected adjacent to the target. Sample data will indicate if contaminant releases into the environment have occurred from former activities at this area of the site and if contaminated soil exists at this location. Soil sample data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes.
	HR-230Q-GP08	Surface soil and subsurface soil	Soil boring for surface soil and subsurface soil samples in the berm located east of the parcel boundary. Sample data will indicate if contaminant releases into the environment have occurred from former activities at this area of the site and if contaminated soil exists at this location. Soil sample data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes.
	HR-230Q-GP09	Surface soil and subsurface soil	Soil boring for surface soil and subsurface soil samples in the creater located east of the parcel boundary. Sample data will indicate if contaminant releases into the environment have occurred from former activities at this area of the site and if contaminated soil exists at this location. Soil sample data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes.
	HR-230Q-GP10	Surface soil and subsurface soil	Soil boring for surface soil and subsurface soil samples in the berm located east of the parcel boundary near the northeastern corner of the extended area of investigation. Sample data will indicate if contaminant releases into the environment have occurred from former activities at this area of the site and if contaminated soil exists at this location. Soil sample data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes.
	HR-230Q-SW/SD01	Surface water and Sediment	Surface water and sediment samples will be collected at the upgradient location of the surface water feature that flows southwest across the parcel. The samples will be collected east of the parcel boundary. Sample data will also be used to assess potential impacts to aquatic biota in the creek and other ecological receptors that may utilize the creek for food and/or habitat purposes.
	HR-230Q-SW/SD02	Surface water and sediment	Surface water and sediment samples will be collected from the surface water feature that flows southwest across the parcel. The samples will be collected at the southwestern portion of the parcel. Sample data will also be used to assess potential impacts to aquatic biota in the creek and other ecological receptors that may utilize the creek for food and/or habitat purposes.

INITIATOR: M. SHOEMAKER DWG. NO.: ... 796887.es.285
PROJ. MGR.: J. YACOB
DRAFT. CHK. BY: S. MORAN
ENGR. CHK. BY: S. MORAN
DATE LAST REV.:
DRAWN BY:
STARTING DATE: 01/04/02
DRAWN BY: D. BOMAR
04/10/02
09:56:25 AM
DBILLING
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LEGEND

UNIMPROVED ROADS AND PARKING

PAVED ROADS AND PARKING

BUILDING

TOPOGRAPHIC CONTOURS
(CONTOUR INTERVAL - 5 FOOT)

TREES / TREELINE

EXTENDED AREA OF INVESTIGATION

FIRING LINES

SURFACE DRAINAGE / CREEK

MANMADE SURFACE DRAINAGE
FEATURE

FENCE

UTILITY POLE

BERM

EXISTING SURFACE WATER/SEDIMENT
SAMPLE LOCATION

EXISTING SUBSURFACE SOIL SAMPLE
LOCATION

EXISTING GROUNDWATER, SURFACE AND
SUBSURFACE SOIL SAMPLE LOCATION

EXISTING DEPOSITIONAL SOIL SAMPLE
LOCATION

EXISTING SEEP WATER SAMPLE
LOCATION

PROPOSED SURFACE WATER/SEDIMENT
SAMPLE LOCATION

PROPOSED SURFACE AND SUBSURFACE
SOIL SAMPLE LOCATION

PROPOSED GROUNDWATER, SURFACE AND
SUBSURFACE SOIL SAMPLE LOCATION

TRAINING AIDS/PHYSICAL FEATURES OBSERVED

①

5-GALLON PLASTIC LID

②

35-GALLON DRUM

③

SHALLOW PITS

④

DEPRESSION

⑤

STEEL POLE WITH 3 PULLEYS

⑥

REMNANTS OF PLATFORM

⑦

5-GALLON SMOKE POTS - FROM FILL AREA

⑧

TRENCH

⑨

POP-UP TARGET AREA

FIGURE 4-1

PROPOSED SAMPLE LOCATIONS

FORMER 37mm ANTITANK RANGE

PARCEL 230Q-X

FORMER RIFLE RANGE

PARCEL 149Q

U. S. ARMY CORPS OF ENGINEERS
MOBILE DISTRICT
FORT McCLELLAN
CALHOUN COUNTY, ALABAMA
Contract No. DACA21-96-D-0018

IT CORPORATION
A Member of The IT Group

Table 4-2

**Surface Soil and Subsurface Soil Sample Designations and QA/QC Sample Quantities
Former Antitank Range, Parcel 230Q-X,
and Former Rifle Range, Parcel 149Q
Fort McClellan, Calhoun County, Alabama**

(Page 1 of 2)

Sample Location	Sample Designation	Sample Depth (ft)	QA/QC Samples			Analytical Suite
			Field Duplicates	Field Splits	MS/MSD	
HR-230Q-GP01	HR-230Q-GP01-SS-QT0001-REG	0-1			HR-230Q-GP01-SS-QT0001-MS/MSD	TAL Metals and Nitroaromatic/Nitramine Explosives
	HR-230Q-GP01-DS-QT0002-REG	2-4				
HR-230Q-GP02	HR-230Q-GP02-SS-QT0003-REG	0-1	HR-230Q-GP02-SS-QT0004-FD			TAL Metals and Nitroaromatic/Nitramine Explosives
	HR-230Q-GP02-DS-QT0005-REG	2-4				
HR-230Q-GP03	HR-230Q-GP03-SS-QT0006-REG	0-1				TAL Metals and Nitroaromatic/Nitramine Explosives
	HR-230Q-GP03-DS-QT0007-REG	2-4				
HR-230Q-GP04	HR-230Q-GP04-SS-QT0008-REG	0-1				TAL Metals and Nitroaromatic/Nitramine Explosives
	HR-230Q-GP04-DS-QT0009-REG	2-4				
HR-230Q-GP05	HR-230Q-GP05-SS-QT0010-REG	0-1			HR-230Q-GP05-SS-QT0010-MS/MSD	TAL Metals, Nitroaromatic/Nitramine Explosives, VOCs, SVOCs, CI and OP Pesticides, and CI Herbicides
	HR-230Q-GP05-DS-QT0011-REG	2-4				
HR-230Q-GP06	HR-230Q-GP06-SS-QT0012-REG	0-1				TAL Metals and Nitroaromatic/Nitramine Explosives
	HR-230Q-GP06-DS-QT0013-REG	2-4				
HR-230Q-GP07	HR-230Q-GP07-SS-QT0014-REG	0-1				TAL Metals and Nitroaromatic/Nitramine Explosives
	HR-230Q-GP07-DS-QT0015-REG	2-4				
HR-230Q-GP08	HR-230Q-GP08-SS-QT0016-REG	0-1				TAL Metals and Nitroaromatic/Nitramine Explosives
	HR-230Q-GP08-DS-QT0017-REG	2-4				
HR-230Q-GP09	HR-230Q-GP09-SS-QT0018-REG	0-1				TAL Metals and Nitroaromatic/Nitramine Explosives
	HR-230Q-GP09-DS-QT0019-REG	2-4				
HR-230Q-GP10	HR-230Q-GP10-SS-QT0020-REG	0-1				TAL Metals, Nitroaromatic/Nitramine Explosives, VOCs, SVOCs, CI and OP Pesticides, and CI Herbicides
	HR-230Q-GP10-DS-QT0021-REG	2-4				
HR-230Q-MW01	HR-230Q-MW01-SS-QT0022-REG	0-1				TAL Metals and Nitroaromatic/Nitramine Explosives
	HR-230Q-MW01-DS-QT0023-REG	2-4				
HR-230Q-MW02	HR-230Q-MW02-SS-QT0024-REG	0-1				TAL Metals and Nitroaromatic/Nitramine Explosives
	HR-230Q-MW02-DS-QT0025-REG	2-4				

Table 4-2

**Surface Soil and Subsurface Soil Sample Designations and QA/QC Sample Quantities
Former Antitank Range, Parcel 230Q-X,
and Former Rifle Range, Parcel 149Q
Fort McClellan, Calhoun County, Alabama**

(Page 2 of 2)

Sample Location	Sample Designation	Sample Depth (ft)	QA/QC Samples			Analytical Suite
			Field Duplicates	Field Splits	MS/MSD	
HR-230Q-MW03	HR-230Q-MW03-SS-QT0026-REG	0-1	HR-230Q-MW03-SS-QT0027-FD			TAL Metals and Nitroaromatic/Nitramine Explosives
	HR-230Q-MW03-DS-QT0028-REG	2-4				

Cl and Op - Chlorinated and Organophosphorous
FD - Field duplicate.
MS/MSD - Matrix spike/matrix spike duplicate.
QA/QC - Quality assurance/quality control.
REG - Field sample.

SVOCs - Semivolatile organic compounds.
TAL - Target analyte list.
TCL - Target compound list.
VOCs - Volatile organic compounds.

4.2.2.1 Sample Locations and Rationale

Subsurface soil samples will be collected from the soil borings proposed on Figure 4-1. The sampling rationale for each subsurface soil sample location is listed in Table 4-1. Subsurface soil sample designations and QA/QC sample requirements are listed in Table 4-2. The final soil boring sampling locations will be determined in the field by the on-site geologist, based on actual field observations and utility clearance results.

4.2.2.2 Sample Collection

Subsurface soil samples will be collected from soil borings at a depth greater than 1 foot bgs in the unsaturated zone. The soil borings will be advanced and soil samples collected using the direct-push sampling procedures specified in Section 5.1.1.1 and Section 6.1.1.1 of the SAP (IT, 2002a). In areas where site access does not permit the use of a direct-push rig, the samples will be collected using a hand auger, as specified in Sections 5.1.1.2 and 6.1.1.1 of the SAP.

Soil samples will be collected continuously for the first four feet or until either groundwater or refusal is met. A detailed lithological log will be recorded by the on-site geologist for each borehole. At least one subsurface sample from each borehole will be selected for analysis. The collected subsurface soil samples will be field-screened using a PID in accordance with Section 6.8.3 of the SAP to measure samples exhibiting elevated readings exceeding background (readings in ambient air). Typically, the subsurface soil sample showing the highest reading (above background) will be selected and sent to the laboratory for analysis. If none of the samples indicates a reading exceeding background using the PID, the deepest interval from the soil boring will be sampled and submitted to the laboratory for analysis. Subsurface soil samples may be selected for analysis from any depth interval if the on-site geologist suspects PSSCs at the interval. Site conditions such as lithology may also determine the actual sample depth interval submitted for analysis. The depth of the boring may be extended beyond four feet bgs and more than one subsurface soil sample may be collected if field measurements and observations indicate a possible layer of PSSCs and/or additional sample data would provide insight to the existence of any PSSCs.

Sample documentation and COC will be recorded as specified in Chapter 6.0 of the SAP.

Sample containers, sample volumes, preservatives, and holding times for the analyses required in this SFSP are discussed in Chapter 4.0 and listed in Table 4-1 of the QAP. The samples will be analyzed for the parameters listed in Section 4.5 of this SFSP.

4.2.3 Permanent Monitoring Wells

Three permanent monitoring wells will be installed at the Former 37mm Antitank Range and the Former Rifle Range. The permanent monitoring well locations are shown on Figure 4-1. The rationale for each monitoring well location is presented in Table 4-1. Monitoring wells will be installed using a truck-mounted hollow-stem auger drill rig. The monitoring well boreholes will be drilled to the top of bedrock, or until adequate groundwater is encountered to install a well with 10 to 20 feet of screen.

The monitoring well casing will consist of new 2-inch inside-diameter (ID), Schedule 40, threaded, flush-joint polyvinyl chloride (PVC) pipe. Attached to the bottom of the well casing will be a section of new threaded, flush-joint, 0.010-inch continuous wrap PVC well screen, approximately 10 to 20 feet long. At the discretion of the IT site manager, a sump (composed of new, 2-inch ID, Schedule 40, threaded, flush-joint PVC) may be attached to the bottom of the well screen. After the casing and screen materials are lowered into the boring, a filter pack will be installed around the well screen. In wells installed to depths of 20 feet or less, the filter pack material will be gravity filled. In wells installed to depths of 20 feet or more, the filter pack will be tremied into place. The filter pack will be installed from the bottom of the well to approximately five feet above the top of the well screen. The filter pack will consist of 20/40 (Number 1) silica sand. A fine sand (30/70 silica sand), approximately five feet thick, may be placed above the filter pack. A bentonite seal, approximately five feet thick, will be placed above the filter pack (or fine sand, if used). The remaining annular space will be grouted with a bentonite-cement mixture, using approximately 7 to 8 gallons of water and approximately 5 pounds of bentonite per 94-pound bag of Type I or Type II Portland cement. The grout will be tremied into place from the top of the bentonite seal to ground surface. Monitoring wells will be completed with stick-up or flush-mount construction as determined by the project geologist.

Soil samples for lithology will be collected starting at five feet bgs, and at five-foot intervals thereafter, to the total depth of the borehole. Lithologic samples will be collected and described to provide a detailed lithologic log. The samples will be collected using a 24-inch-long, 2-inch-or-larger-diameter split-spoon sampler. The soil borings will be logged in accordance with American Standard for Testing and Materials Method D 2488 using the Unified Soil Classification System. The soil samples will be screened in the field for the presence of volatile organic compound (VOC) contamination using a PID. The monitoring wells will be drilled, installed, and developed as specified in Section 5.1 and Appendix C of the SAP (IT, 2002a). The

exact monitoring well locations will be determined in the field by the on-site geologist, based on actual field conditions. Monitoring wells will be allowed to equilibrate for 14 days after well development prior to collecting groundwater samples.

4.2.4 Groundwater Sampling

Groundwater samples will be collected from the three monitoring wells completed at the Former 37mm Antitank Range and the Former Rifle Range as presented in Section 4.2.3.

4.2.4.1 Sample Locations and Rationale

Groundwater samples will be collected from the monitoring well locations shown on Figure 4-1. The groundwater sampling rationale is listed in Table 4-1. The groundwater sample designations and required QA/QC sample quantities are listed in Table 4-3.

4.2.4.2 Sample Collection

Prior to sampling monitoring wells, static water level will be measured from each of the monitoring wells installed at the site to define the groundwater flow in the residuum aquifer. Water level measurements will be performed as outlined in Section 5.5 of the SAP (IT, 2002a). Groundwater samples will be collected in accordance with the procedures outlined in Section 6.1.1.5 and Attachment 5 of the SAP. Low-flow groundwater sampling methodology outlined in Attachment 5 of the SAP may be used as deemed necessary by the IT site manager.

Sample documentation and COC will be recorded as specified in Chapter 6.0 of the SAP. Sample containers, sample volumes, preservatives, and holding times for the analyses required in this SFSP are discussed in Chapter 4.0 and listed in Table 4-1 of the QAP (IT, 2002a). The samples will be analyzed for the parameters listed in Section 4.5 of this SFSP.

4.2.5 Surface Water Sampling

Two surface water samples will be collected from the intermittent drainage feature that flows through the area of investigation.

4.2.5.1 Sample Locations and Rationale

The surface water sampling rationale for each location is listed in Table 4-1. The surface water samples will be collected from the proposed locations on Figure 4-1. The surface water sample designations and required QA/QC sample requirements are listed in Table 4-4. The exact

Table 4-3

**Groundwater Sample Designations and QA/QC Sample Quantities
Former Antitank Range, Parcel 230Q-X, and Former Rifle Range, Parcel 149Q
Fort McClellan, Alabama**

Sample Location	Sample Designation	Sample Matrix	QA/QC Samples	Field Splits	MS/MSD	Analytical Suite
			Field Duplicates			
HR-230Q-MW01	HR-230Q-MW01-GW-QT3001-REG	Groundwater ^a			HR-230Q-MW01-GW-QT3001-MS/MD	TAL Metals, Nitroaromatic/Nitramine Explosives, VOCs, SVOCs, CI and OP Pesticides, and CI Herbicides
HR-230Q-MW02	HR-230Q-MW02-GW-QT3002-REG	Groundwater ^a	HR-230Q-MW02-GW-QT3003-FD			TAL Metals and Nitroaromatic/Nitramine Explosives
HR-230Q-MW03	HR-230Q-MW03-GW-QT3004-REG	Groundwater ^a				TAL Metals and Nitroaromatic/Nitramine Explosives

^a Groundwater samples will be collected from the approximate top 5 to 10 feet of the water column per Attachment 5 of the installation-wide sampling and analysis plan (IT Corporation, 2002a).

CI and Op - Chlorinated and Organophosphorous.
FD - Field duplicate.
MS/MSD - Matrix spike/matrix spike duplicate.
QA/QC - Quality assurance/quality control.
REG - Field sample.

SVOCs - Semivolatile organic compounds.
TAL - Target analyte list.
TCL - Target compound list.
VOCs - Volatile organic compounds.

Table 4-4

Surface Water and Sediment Sample Designations and QA/QC Sample Quantities
Former Antitank Range, Parcel 230Q-X, and Former Rifle Range, Parcel 149Q
Fort McClellan, Calhoun County, Alabama

Sample Location	Sample Designation	Sample Matrix	Sample Depth (ft)	QA/QC Samples			Analytical Suite
				Field Duplicates	Field Splits	MS/MSD	
HR-230Q-SW/SD01	HR-230Q-SW/SD01-SW-QT2001-REG	surface water	a	HR-230Q-SW/SD01-SW-QT2002-FD			TAL Metals, Nitroaromatic/Nitramine Explosives, VOCs, SVOCs, CI and OP Pesticides, and CI Herbicides
	HR-230Q-SW/SD01-SD-QT1001-REG	sediment	0-0.5	HR-230Q-SW/SD01-SD-QT1002-FD			
HR-230Q-SW/SD02	HR-230Q-SW/SD02-SW-QT2003-REG	surface water	a			HR-230Q-SW/SD02-SW-QT2003-MS/MSD	TAL Metals and Nitroaromatic/Nitramine Explosives TOC, Grain Size (sediment only)
	HR-230Q-SW/SD02-SD-QT1003-REG	sediment	0-0.5			HR-230Q-SW/SD02-SD-QT1003-MS/MSD	

* Sample depth will depend on where sufficient water is encountered to collect a water sample.

CI and Op - Chlorinated and Organophosphorous.

FD - Field duplicate.

MS/MSD - Matrix spike/matrix spike duplicate.

QA/QC - Quality assurance/quality control.

REG - Field sample.

SVOCs - Semivolatile organic compounds.

TAL - Target analyte list.

TCL - Target compound list.

TOC - Total organic carbon

VOCs - Volatile organic compounds.

sampling locations will be determined in the field by the ecological sampler, based on drainage pathways and actual field observations.

4.2.5.2 Sample Collection

The surface water samples will be collected in accordance with the procedures specified in Section 6.1.1.3 of the SAP (IT, 2002a). Sample documentation and COC will be recorded as specified in Chapter 6.0 of the SAP. Sample containers, sample volumes, preservatives, and holding times for the analyses required in this SFSP are discussed in Chapter 4.0 and listed in Table 4-1 of the QAP. The samples will be analyzed for the parameters listed in Section 4.5 of this SFSP.

4.2.6 Sediment Sampling

Two sediment samples will be collected from the same locations as the surface water samples described in Section 4.2.5.

4.2.6.1 Sample Locations and Rationale

The proposed locations for the sediment samples are shown in Figure 4-1. Sediment sampling rationale for each location is presented in Table 4-1. The sediment sample designations and required QA/QC sample requirements are listed in Table 4-4. The actual sediment sample points will be at the discretion of the ecological sampler, based on the drainage pathways and actual field observations.

4.2.6.2 Sample Collection

The sediment samples will be collected in accordance with the procedures specified in Section 6.1.1.2 of the SAP. Sample documentation and COC will be recorded as specified in Chapter 6.0 of the SAP. Sample containers, sample volumes, preservatives, and holding times for the analyses required in this SFSP are discussed in Chapter 4.0 and listed in Table 4-1 of the QAP. The sediment samples will be analyzed for the parameters listed in Section 4.5 of this SFSP.

4.3 Decontamination Requirements

Decontamination will be performed on sampling and non-sampling equipment to prevent cross-contamination between sampling locations. Decontamination of sampling equipment will be performed in accordance with the requirements presented in Section 6.5.1.1 of the SAP (IT, 2002a). Decontamination of non-sampling equipment will be performed in accordance with the requirements presented in Section 6.5.1.2 of the SAP.

4.4 Surveying of Sample Locations

Sampling locations will be marked with pin flags, stakes, and/or flagging and will be surveyed using either global positioning system (GPS) or conventional civil survey techniques, as necessary to obtain the required level of accuracy. Horizontal coordinates will be referenced to the U.S. State Plane Coordinate System, Alabama East Zone, North American Datum of 1983. Elevations will be referenced to the North American Vertical Datum of 1988.

Horizontal coordinates for soil sample locations will be recorded using a GPS to provide accuracy within 1 meter. Because of the need to use permanent monitoring wells to determine water levels, a higher level of accuracy is required. Monitoring wells will be surveyed to an accuracy of 0.1 foot for horizontal coordinates and 0.01 foot for elevations, using survey-grade GPS techniques and/or conventional civil survey techniques, as required. Procedures to be used for GPS surveying are described in Section 4.4.1.1 of the SAP. Conventional land survey requirements are presented in Section 4.4.1.2 of the SAP.

4.5 Analytical Program

Samples collected at locations specified in this section of this SFSP will be analyzed for a specific suite of chemicals and elements based on the history of site usage, as well as EPA, ADEM, FTMC, and USACE requirements. Target analyses for samples collected from Former 37mm Antitank Range, Parcel 230Q-X, and Former Rifle Range, Parcel 149Q, consist of the following list of analytical suites:

- Target analyte metals - Method 6010B/7000
- Nitroaromatic/nitramine explosives – Method 8330.

Ten percent of each sample type will be analyzed for an expanded suite of parameters that includes:

- Target compound list volatile organic compounds - Method 5035/8260B
- Target compound list semivolatile organic compounds - Method 8270C
- Chlorinated herbicides - Method 8151A
- Chlorinated pesticides - Method 8081A
- Organophosphorus pesticides - Method 8141A.

The samples will be analyzed using EPA SW-846 methods, including Update III Methods where applicable, as presented in Table 4-5 in this SFSP and Chapter 5.0 in the QAP. Data will be

Table 4-5

**Analytical Samples
Site Investigation
Former Antitank Range, Parcel 230Q-X, and Former Rifle Range, Parcel 149Q
Fort McClellan, Calhoun County, Alabama**

Parameters	Analysis Method	Sample Matrix	TAT Needed	Field Samples			QA/QC Samples ^a				EMAX
				No. of Sample Points	No. of Events	No. of Field Samples	Field Dups (10%)	MS/MSD (5%)	Trip Blank (1/ship)	Eq. Rinse (1/wk/matrix)	Total No. Analysis

Parcel 230Q-X: 5 water matrix samples (3 groundwater samples and 2 surface water samples; **28 soil matrix samples** (13 surface soil samples, 13 subsurface soil samples, and 2 sediment samples)

Explosives	8330	water	normal	5	1	5	2	2	0	1	12
TAL Metals	6010B/7000	water	normal	5	1	5	2	2	0	1	12
TCL VOCs	8260B	water	normal	2	1	2	1	1	2	1	8
TCL SVOCs	8270C	water	normal	2	1	2	1	1	0	1	6
Chlorinated Pesticides	8081A	water	normal	2	1	2	1	1	0	1	6
Organophosphorus Pesticides	8141A	water	normal	2	1	2	1	1	0	1	6
Chlorinated Herbicides	8151A	water	normal	2	1	2	1	1	0	1	6
Explosives	8330	soil	normal	28	1	28	3	3	0	2	39
TAL Metals	6010B/7000	soil	normal	28	1	28	3	3	0	2	39
TCL VOCs	8260B	soil	normal	3	1	3	1	1	0	2	8
TCL SVOCs	8270C	soil	normal	3	1	3	1	1	0	2	8
Chlorinated Pesticides	8081A	soil	normal	3	1	3	1	1	0	2	8
Organophosphorus Pesticides	8141A	soil	normal	3	1	3	1	1	0	2	8
Chlorinated Herbicides	8151A	soil	normal	3	1	3	1	1	0	2	8
TOC	9060	soil	normal	2	1	2	0	0	0	0	2
Grain Size ASTM D-421/D-422		soil	normal	2	1	2	0	0	0	0	2

Parcel 230Q-X Subtotal: 95 20 20 2 21 178

^aField duplicate, and MS/MSD samples were calculated as a percentage of the field samples collected per site and were rounded to the nearest whole number.

Trip blank samples will be collected with water matrix samples for VOC analysis only. Assumed four field samples per day to estimate trip blanks. Equipment blanks will be collected once per event whenever sampling equipment is field decontaminated and re-used.

MS/MSD - Matrix spike/matrix spike duplicate.

Explosives - Nitroaromatic and Nitramine.

QA/QC - Quality assurance/quality control.

SVOCs - Semivolatile organic compounds.

TAL - Target analyte list.

TAT - Turn-around time

TCL - Target compound list.

VOCs - Volatile organic compounds.

Ship samples to: EMAX Laboratories, Inc.
1835 205th Street
Torrance, CA 90501
Attn: Elizabeth McIntyre
Tel: 310-618-8889
Fax: 310-618-0818

reported in accordance with definitive data requirements of Chapter 2 of the USACE Engineering Manual 200-1-6, *Chemical Quality Assurance For Hazardous, Toxic and Radioactive Waste (HTRW) Projects* (USACE, 1997), and evaluated by the stipulated requirements for the generation of definitive data (Section 7.2.2 of the QAP). Chemical data will be reported by the laboratory via hard-copy data packages using Contract Laboratory Program-like forms, along with electronic copies. These packages will be validated in accordance with EPA National Functional Guidelines by Level III criteria.

4.6 Sample Preservation, Packaging, and Shipping

Sample preservation, packaging, and shipping will follow the procedures specified in Sections 6.1.3 through 6.1.7 of the SAP (IT, 2002a). Completed analysis request/COC records will be secured and included with each shipment of coolers to:

Attn: Sample Receiving/Elizabeth McIntyre
EMAX Laboratories, Inc.
1835 205th Street
Torrance, California 90501
Telephone: (310) 618-8889.

4.7 Investigation-Derived Waste Management

Management and disposal of the investigation-derived wastes (IDW) will follow procedures and requirements described in Appendix D of the SAP (IT, 2002a). The IDW expected to be generated at Former 37mm Antitank Range and Former Rifle Range, will include decontamination fluids, drill cuttings, purge water, and disposable personal protective equipment. Sampling of the IDW to obtain analytical results for characterizing the waste for disposal will follow procedures specified in Section 6.1.1.8 of the SAP.

4.8 Site-Specific Safety and Health

Health and safety requirements for this SI are provided in the SSHP attachment for Former 37mm Antitank Range and Former Rifle Range. The SSHP attachment will be used in conjunction with the installation-wide safety and health plan.

5.0 *Project Schedule*

The project schedule for the SI activities will be provided by the IT project manager to the Base Realignment and Closure Team.

6.0 References

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U.S. Department of Agriculture (USDA), 1961, *Soil Survey, Calhoun County, Alabama*, Soil Conservation Service, Series 1958, No. 9, September.

U.S. Environmental Protection Agency (EPA), 2000, *Guidance for the Data Quality Objectives Process, EPA 600/R-96/005*, August.

ATTACHMENT 1

LIST OF ABBREVIATIONS AND ACRONYMS

List of Abbreviations and Acronyms

2,4-D	2,4-dichlorophenoxyacetic acid
2,4,5-T	2,4,5-trichlorophenoxyacetic acid
2,4,5-TP	silvex
3D	3D International Environmental Group
AB	ambient blank
AbB3	Anniston gravelly clay loam, 2 to 6 percent slopes, severely eroded
AbC3	Anniston gravelly clay loam, 6 to 10 percent slopes, severely eroded
AbD3	Anniston and Allen gravelly clay loams, 10 to 15 percent slopes, eroded
Abs	skin absorption
ABS	dermal absorption factor
AC	hydrogen cyanide
ACAD	AutoCadd
AcB2	Anniston and Allen gravelly loams, 2 to 6 percent slopes, eroded
AcC2	Anniston and Allen gravelly loams, 6 to 10 percent slopes, eroded
AcD2	Anniston and Allen gravelly loams, 10 to 15 percent slopes, eroded
AcE2	Anniston and Allen gravelly loams, 15 to 25 percent slopes, eroded
ACGIH	American Conference of Governmental Industrial Hygienists
AdE	Anniston and Allen stony loam, 10 to 25 percent slope
ADEM	Alabama Department of Environmental Management
ADPH	Alabama Department of Public Health
AEC	U.S. Army Environmental Center
AEL	airborne exposure limit
AET	adverse effect threshold
AF	soil-to-skin adherence factor
AHA	ammunition holding area
AL	Alabama
ALAD	-aminolevulinic acid dehydratase
amb.	Amber
amsl	above mean sea level
ANAD	Anniston Army Depot
AOC	area of concern
APEC	areas of potential ecological concern
APT	armor-piercing tracer
AR	analysis request
ARAR	applicable or relevant and appropriate requirement
AREE	area requiring environmental evaluation
ASP	Ammunition Supply Point
ASR	Archives Search Report
AST	aboveground storage tank
ASTM	American Society for Testing and Materials
AT	averaging time
ATSDR	Agency for Toxic Substances and Disease Registry
ATV	all-terrain vehicle
AWARE	Associated Water and Air Resources Engineers, Inc.
AWWSB	Anniston Water Works and Sewer Board
‘B’	Analyte detected in laboratory or field blank at concentration greater than the reporting limit (and greater than zero)
BCF	blank correction factor; bioconcentration factor

BCT	BRAC Cleanup Team
BERA	baseline ecological risk assessment
BEHP	bis(2-ethylhexyl)phthalate
BFB	bromofluorobenzene
BFE	base flood elevation
BG	Bacillus globigii
bgs	below ground surface
BHC	betahexachlorocyclohexane
BHHRA	baseline human health risk assessment
BIRTC	Branch Immaterial Replacement Training Center
bkg	background
bls	below land surface
BOD	biological oxygen demand
Bp	soil-to-plant biotransfer factors
BRAC	Base Realignment and Closure
Braun	Braun Intertec Corporation
BSAF	biota-to-sediment accumulation factors
BSC	background screening criterion
BTAG	Biological Technical Assistance Group
BTEX	benzene, toluene, ethyl benzene, and xylenes
BTOC	below top of casing
BTV	background threshold value
BW	biological warfare; body weight
BZ	breathing zone; 3-quinuclidinyl benzilate
C	ceiling limit value
Ca	carcinogen
CAB	chemical warfare agent breakdown products
CAMU	corrective action management unit
CBR	chemical, biological and radiological
CCAL	continuing calibration
CCB	continuing calibration blank
CCV	continuing calibration verification
CD	compact disc
CDTF	Chemical Defense Training Facility
CEHNC	U.S. Army Engineering and Support Center, Huntsville
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CERFA	Community Environmental Response Facilitation Act
CESAS	Corps of Engineers South Atlantic Savannah
CF	conversion factor
CFC	chlorofluorocarbon
CFDP	Center for Domestic Preparedness
CFR	Code of Federal Regulations
CG	carbonyl chloride (phosgene)
CGI	combustible gas indicator
ch	inorganic clays of high plasticity
CHPPM	U.S. Army Center for Health Promotion and Preventive Medicine
CK	cyanogen chloride
cl	inorganic clays of low to medium plasticity

Cl.	chlorinated
CLP	Contract Laboratory Program
cm	centimeter
CN	chloroacetophenone
CNB	chloroacetophenone, benzene, and carbon tetrachloride
CNS	chloroacetophenone, chloropicrin, and chloroform
CO	carbon monoxide
Co-60	cobalt-60
CoA	Code of Alabama
COC	chain of custody; contaminant of concern
COE	Corps of Engineers
Con	skin or eye contact
COPC	chemical(s) of potential concern
COPEC	chemical(s) of potential ecological concern
CPSS	chemicals present in site samples
CQCSM	Contract Quality Control System Manager
CRDL	contract-required detection limit
CRL	certified reporting limit
CRQL	contract-required quantitation limit
CRZ	contamination reduction zone
Cs-137	cesium-137
CS	ortho-chlorobenzylidene-malononitrile
CSEM	conceptual site exposure model
CSM	conceptual site model
CT	central tendency
ctr.	container
CWA	chemical warfare agent
CWM	chemical warfare material; clear, wide mouth
CX	dichloroformoxime
‘D’	duplicate; dilution
D&I	detection and identification
DAF	dilution-attenuation factor
DANC	decontamination agent, non-corrosive
°C	degrees Celsius
°F	degrees Fahrenheit
DCE	dichloroethene
DDD	dichlorodiphenyldichloroethane
DDE	dichlorodiphenyldichloroethene
DDT	dichlorodiphenyltrichloroethane
DEH	Directorate of Engineering and Housing
DEP	depositional soil
DFTPP	decafluorotriphenylphosphine
DI	deionized
DID	data item description
DIMP	di-isopropylmethylphosphonate
DM	dry matter
DMBA	dimethylbenz(a)anthracene
DMMP	dimethylmethylphosphonate

List of Abbreviations and Acronyms (Continued)

DOD	U.S. Department of Defense
DOJ	U.S. Department of Justice
DOT	U.S. Department of Transportation
DP	direct-push
DPDO	Defense Property Disposal Office
DPT	direct-push technology
DQO	data quality objective
DRMO	Defense Reutilization and Marketing Office
DRO	diesel range organics
DS	deep (subsurface) soil
DS2	Decontamination Solution Number 2
DWEL	drinking water equivalent level
E&E	Ecology and Environment, Inc.
EB	equipment blank
EBS	environmental baseline survey
EC ₅₀	effects concentration for 50 percent of a population
ECBC	Edgewood Chemical/Biological Command
ED	exposure duration
EDD	electronic data deliverable
EF	exposure frequency
EDQL	ecological data quality level
EE/CA	engineering evaluation and cost analysis
Elev.	elevation
EM	electromagnetic
EMI	Environmental Management Inc.
EM31	Geonics Limited EM31 Terrain Conductivity Meter
EM61	Geonics Limited EM61 High-Resolution Metal Detector
EOD	explosive ordnance disposal
EODT	explosive ordnance disposal team
EPA	U.S. Environmental Protection Agency
EPC	exposure point concentration
EPIC	Environmental Photographic Interpretation Center
EPRI	Electrical Power Research Institute
ER	equipment rinsate
ERA	ecological risk assessment
ER-L	effects range-low
ER-M	effects range-medium
ESE	Environmental Science and Engineering, Inc.
ESMP	Endangered Species Management Plan
ESN	Environmental Services Network, Inc.
ESV	ecological screening value
ET	exposure time
EU	exposure unit
Exp.	explosives
E-W	east to west
EZ	exclusion zone
FAR	Federal Acquisition Regulations
FB	field blank

FD	field duplicate
FDA	U.S. Food and Drug Administration
FedEx	Federal Express, Inc.
FEMA	Federal Emergency Management Agency
FFCA	Federal Facilities Compliance Act
FFE	field flame expedient
FFS	focused feasibility study
FI	fraction of exposure
Fil	filtered
Flt	filtered
FMDC	Fort McClellan Development Commission
FML	flexible membrane liner
FMP 1300	Former Motor Pool 1300
FOMRA	Former Ordnance Motor Repair Area
Foster Wheeler	Foster Wheeler Environmental Corporation
Frtn	fraction
FS	field split; feasibility study
FSP	field sampling plan
ft	feet
ft/ft	feet per foot
FTA	Fire Training Area
FTMC	Fort McClellan
FTRRRA	FTMC Reuse & Redevelopment Authority
g	gram
g/m ³	gram per cubic meter
G-856	Geometrics, Inc. G-856 magnetometer
G-858G	Geometrics, Inc. G-858G magnetic gradiometer
GAF	gastrointestinal absorption factor
gal	gallon
gal/min	gallons per minute
GB	sarin
gc	clay gravels; gravel-sand-clay mixtures
GC	gas chromatograph
GCL	geosynthetic clay liner
GC/MS	gas chromatograph/mass spectrometer
GCR	geosynthetic clay liner
GFAA	graphite furnace atomic absorption
GIS	Geographic Information System
gm	silty gravels; gravel-sand-silt mixtures
gp	poorly graded gravels; gravel-sand mixtures
gpm	gallons per minute
GPR	ground-penetrating radar
GPS	global positioning system
GS	ground scar
GSA	General Services Administration; Geologic Survey of Alabama
GSBP	Ground Scar Boiler Plant
GSSI	Geophysical Survey Systems, Inc.
GST	ground stain

GW	groundwater
gw	well-graded gravels; gravel-sand mixtures
HA	hand auger
HCl	hydrochloric acid
HD	distilled mustard
HDPE	high-density polyethylene
HEAST	Health Effects Assessment Summary Tables
Herb.	herbicides
HHRA	human health risk assessment
HI	hazard index
HPLC	high performance liquid chromatography
HNO ₃	nitric acid
HQ	hazard quotient
HQ _{screen}	screening-level hazard quotient
hr	hour
H&S	health and safety
HSA	hollow-stem auger
HTRW	hazardous, toxic, and radioactive waste
‘I’	out of control, data rejected due to low recovery
IATA	International Air Transport Authority
ICAL	initial calibration
ICB	initial calibration blank
ICP	inductively-coupled plasma
ICRP	International Commission on Radiological Protection
ICS	interference check sample
ID	inside diameter
IDL	instrument detection limit
IDLH	immediately dangerous to life or health
IDM	investigative-derived media
IDW	investigation-derived waste
IEUBK	Integrated Exposure Uptake Biokinetic
IF	ingestion factor; inhalation factor
ILCR	incremental lifetime cancer risk
IMPA	isopropylmethyl phosphonic acid
IMR	Iron Mountain Road
in.	inch
Ing	ingestion
Inh	inhalation
IP	ionization potential
IPS	International Pipe Standard
IR	ingestion rate
IRDMIS	Installation Restoration Data Management Information System
IRIS	Integrated Risk Information Service
IRP	Installation Restoration Program
IS	internal standard
ISCP	Installation Spill Contingency Plan
IT	IT Corporation
ITEMS	IT Environmental Management System™

List of Abbreviations and Acronyms *(Continued)*

‘J’	estimated concentration	MMBtu/hr	million Btu per hour	NRCC	National Research Council of Canada
JeB2	Jefferson gravelly fine sandy loam, 2 to 6 percent slopes, eroded	MOGAS	motor vehicle gasoline	NRHP	National Register of Historic Places
JeC2	Jefferson gravelly fine sandy loam, 6 to 10 percent slopes, eroded	MP	Military Police	ns	nanosecond
JfB	Jefferson stony fine sandy loam, 0 to 10 percent slopes have strong slopes	MPA	methyl phosphonic acid	N-S	north to south
JPA	Joint Powers Authority	MPM	most probable munition	NS	not surveyed
K	conductivity	MQL	method quantitation limit	NSA	New South Associates, Inc.
K _{ow}	octonal-water partition coefficient	MR	molasses residue	nT	nanotesla
L	lewisite; liter	MRL	method reporting limit	nT/m	nanoteslas per meter
l	liter	MS	matrix spike	NTU	nephelometric turbidity unit
LBP	lead-based paint	mS/cm	millisiemens per centimeter	nv	not validated
LC	liquid chromatography	mS/m	millisiemens per meter	O ₂	oxygen
LCS	laboratory control sample	MSD	matrix spike duplicate	O&G	oil and grease
LC ₅₀	lethal concentration for 50 percent population tested	MTBE	methyl tertiary butyl ether	O&M	operation and maintenance
LD ₅₀	lethal dose for 50 percent population tested	msl	mean sea level	OB/OD	open burning/open detonation
LEL	lower explosive limit	MtD3	Montevallo shaly, silty clay loam, 10 to 40 percent slopes , severely eroded	OD	outside diameter
LOAEL	lowest-observed-advserse-effects-level	mV	millivolts	OE	ordnance and explosives
LT	less than the certified reporting limit	MW	monitoring well	oh	organic clays of medium to high plasticity
LUC	land-use control	MWI&P	Monitoring Well Installation and Management Plan	ol	organic silts and organic silty clays of low plasticity
LUCAP	land-use control assurance plan	Na	sodium	OP	organophosphorus
LUCIP	land-use control implementation plan	NA	not applicable; not available	ORP	oxidation-reduction potential
max	maximum	NAD	North American Datum	OSHA	Occupational Safety and Health Administration
MB	method blank	NAD83	North American Datum of 1983	OSWER	Office of Solid Waste and Emergency Response
MCL	maximum contaminant level	NAVD88	North American Vertical Datum of 1988	OVM-PID/FID	organic vapor meter-photoionization detector/flame ionization detector
MCLG	maximum contaminant level goal	NAS	National Academy of Sciences	OVS	oil/water separator
MCPA	4-chloro-2-methylphenoxyacetic acid	NCEA	National Center for Environmental Assessment	oz	ounce
MCS	media cleanup standard	NCP	National Contingency Plan	PA	preliminary assessment
MD	matrix duplicate	NCRP	National Council on Radiation Protection and Measurements	PAH	polynuclear aromatic hydrocarbon
MDC	maximum detected concentration	ND	not detected	PARCCS	precision, accuracy, representativeness, comparability, completeness, and sensitivity
MDCC	maximum detected constituent concentration	NE	no evidence; northeast	Parsons	Parsons Engineering Science, Inc.
MDL	method detection limit	ne	not evaluated	Pb	lead
mg	milligrams	NEW	net explosive weight	PBMS	performance-based measurement system
mg/kg	milligrams per kilogram	NFA	No Further Action	PC	permeability coefficient
mg/kg/day	milligram per kilogram per day	NG	National Guard	PCB	polychlorinated biphenyl
mg/kgbw/day	milligrams per kilogram of body weight per day	NGP	National Guardsperson	PCDD	polychlorinated dibenzo-p-dioxins
mg/L	milligrams per liter	ng/L	nanograms per liter	PCDF	polychlorinated dibenzofurans
mg/m ³	milligrams per cubic meter	NGVD	National Geodetic Vertical Datum	PCE	perchloroethene
mh	inorganic silts, micaceous or diatomaceous fine, sandy or silt soils	Ni	nickel	PCP	pentachlorophenol
MHz	megahertz	NIC	notice of intended change	PDS	Personnel Decontamination Station
µg/g	micrograms per gram	NIOSH	National Institute for Occupational Safety and Health	PEF	particulate emission factor
µg/kg	micrograms per kilogram	NIST	National Institute of Standards and Technology	PEL	permissible exposure limit
µg/L	micrograms per liter	NLM	National Library of Medicine	PES	potential explosive site
µmhos/cm	micromhos per centimeter	NPDES	National Pollutant Discharge Elimination System	Pest.	pesticides
min	minimum	NPW	net present worth	PETN	pentarey thritol tetranitrate
MINICAMS	miniature continuous air monitoring system	No.	number	PFT	portable flamethrower
ml	inorganic silts and very fine sands	NOAA	National Oceanic and Atmospheric Administration	PG	professional geologist
mL	milliliter	NOAEL	no-observed-adverse-effects-level	PID	photoionization detector
mm	millimeter	NR	not requested; not recorded; no risk	PkA	Philo and Stendal soils local alluvium, 0 to 2 percent slopes
MM	mounded material	NRC	National Research Council		

List of Abbreviations and Acronyms (Continued)

PM	project manager	RTECS	Registry of Toxic Effects of Chemical Substances	STEL	short-term exposure limit
POC	point of contact	RTK	real-time kinematic	STL	Severn-Trent Laboratories
POL	petroleum, oils, and lubricants	SA	exposed skin surface area	STOLS	Surface Towed Ordnance Locator System®
POW	prisoner of war	SAD	South Atlantic Division	Std. units	standard units
PP	peristaltic pump; Proposed Plan	SAE	Society of Automotive Engineers	SU	standard unit
ppb	parts per billion	SAIC	Science Applications International Corporation	SUXOS	senior UXO supervisor
PPE	personal protective equipment	SAP	installation-wide sampling and analysis plan	SVOC	semivolatile organic compound
ppm	parts per million	sc	clayey sands; sand-clay mixtures	SW	surface water
PPMP	Print Plant Motor Pool	Sch.	Schedule	SW-846	U.S. EPA’s <i>Test Methods for Evaluating Solid Waste: Physical/Chemical Methods</i>
ppt	parts per thousand	SCM	site conceptual model	SWMU	solid waste management unit
PR	potential risk	SD	sediment	SWPP	storm water pollution prevention plan
PRA	preliminary risk assessment	SDG	sample delivery group	SZ	support zone
PRG	preliminary remediation goal	SDZ	safe distance zone; surface danger zone	TAL	target analyte list
PSSC	potential site-specific chemical	SEMS	Southern Environmental Management & Specialties, Inc.	TAT	turn around time
pt	peat or other highly organic silts	SF	cancer slope factor	TB	trip blank
PVC	polyvinyl chloride	SFSP	site-specific field sampling plan	TBC	to be considered
QA	quality assurance	SGF	standard grade fuels	TCA	trichloroethane
QA/QC	quality assurance/quality control	SHP	installation-wide safety and health plan	TCDD	2,3,7,8-tetrachlorodibenzo-p-dioxin
QAM	quality assurance manual	SI	site investigation	TCDF	tetrachlorodibenzofurans
QAO	quality assurance officer	SINA	Special Interest Natural Area	TCE	trichloroethene
QAP	installation-wide quality assurance plan	SL	standing liquid	TCL	target compound list
QC	quality control	SLERA	screening-level ecological risk assessment	TCLP	toxicity characteristic leaching procedure
QST	QST Environmental, Inc.	sm	silty sands; sand-silt mixtures	TDEC	Tennessee Department of Environment and Conservation
qty	quantity	SM	Serratia marcescens	TDGCL	thiodiglycol
Qual	qualifier	SMDP	Scientific Management Decision Point	TDGCLA	thiodiglycol chloroacetic acid
‘R’	rejected data; resample	s/n	signal-to-noise ratio	TERC	Total Environmental Restoration Contract
R&A	relevant and appropriate	SOP	standard operating procedure	THI	target hazard index
RA	remedial action	SOPQAM	U.S. EPA’s <i>Standard Operating Procedure/Quality Assurance Manual</i>	TIC	tentatively identified compound
RAO	removal action objective	sp	poorly graded sands; gravelly sands	TLV	threshold limit value
RBC	risk-based concentration	SP	submersible pump	TN	Tennessee
RCRA	Resource Conservation and Recovery Act	SPCC	system performance calibration compound	TNT	trinitrotoluene
RD	remedial design	SPCS	State Plane Coordinate System	TOC	top of casing; total organic carbon
RDX	cyclonite	SPM	sample planning module	TPH	total petroleum hydrocarbons
ReB3	Rarden silty clay loams	SQRT	screening quick reference tables	TR	target cancer risk
REG	regular field sample	Sr-90	strontium-90	TRADOC	U.S. Army Training and Doctrine Command
REL	recommended exposure limit	SRA	streamlined human health risk assessment	TRPH	total recoverable petroleum hydrocarbons
RFA	request for analysis	SRM	standard reference material	TSCA	Toxic Substances Control Act
RfC	reference concentration	Ss	stony rough land, sandstone series	TSDF	treatment, storage, and disposal facility
RfD	reference dose	SS	surface soil	TWA	time-weighted average
RGO	remedial goal option	SSC	site-specific chemical	UCL	upper confidence limit
RI	remedial investigation	SSHO	site safety and health officer	UCR	upper certified range
RL	reporting limit	SSHP	site-specific safety and health plan	‘U’	not detected above reporting limit
RME	reasonable maximum exposure	SSL	soil screening level	UF	uncertainty factor
ROD	Record of Decision	SSSL	site-specific screening level	USACE	U.S. Army Corps of Engineers
RPD	relative percent difference	SSSSL	site-specific soil screening level	USACHPPM	U.S. Army Center for Health Promotion and Preventive Medicine
RRF	relative response factor	STB	supertropical bleach	USAEC	U.S. Army Environmental Center
RSD	relative standard deviation	STC	source-term concentration	USAEHA	U.S. Army Environmental Hygiene Agency
RTC	Recruiting Training Center	STD	standard deviation	USACMLS	U.S. Army Chemical School

List of Abbreviations and Acronyms (Continued)

USAMPS	U.S. Army Military Police School
USATCES	U.S. Army Technical Center for Explosive Safety
USATEU	U.S. Army Technical Escort Unit
USATHAMA	U.S. Army Toxic and Hazardous Material Agency
USC	United States Code
USCS	Unified Soil Classification System
USDA	U.S. Department of Agriculture
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
UST	underground storage tank
UTL	upper tolerance level; upper tolerance limit
UXO	unexploded ordnance
UXOQCS	UXO Quality Control Supervisor
UXOSO	UXO safety officer
V	vanadium
VOA	volatile organic analyte
VOC	volatile organic compound
VOH	volatile organic hydrocarbon
VQlfr	validation qualifier
VQual	validation qualifier
VX	nerve agent (O-ethyl-S-[diisopropylaminoethyl]-methylphosphonothiolate)
WAC	Women’s Army Corps
Weston	Roy F. Weston, Inc.
WP	installation-wide work plan
WRS	Wilcoxon rank sum
WS	watershed
WSA	Watershed Screening Assessment
WWI	World War I
WWII	World War II
XRF	x-ray fluorescence
yd ³	cubic yards

- S – Non-target compound analyzed for and detected (GC/MS methods)
- T – Non-target compound analyzed for but not detected (non GC/MS methods)
- U – Analysis in unconfirmed
- Z – Non-target compound analyzed for and detected (non-GC/MS methods)

Qualifiers

- J – The low-spike recovery is low
- N – The high-spike recovery is low
- R – Data is rejected

SAIC – Data Qualifiers, Codes and Footnotes, 1995 Remedial Investigation

N/A – Not analyzed

ND – Not detected

Boolean Codes

- LT – Less than the certified reporting limit

Flagging Codes

- 9 – Non-demonstrated/validated method performed for USAEC
- B – Analyte found in the method blank or QC blank
- C – Analysis was confirmed
- D – Duplicate analysis
- I – Interfaces in sample make quantitation and/or identification to be suspicious
- J – Value is estimated
- K – Reported results are affected by interfaces or high background
- N – Tentatively identified compound (match greater than 70%)
- Q – Sample interference obscured peak of interest
- R – Non-target compound analyzed for but not detected (GC/MS methods)